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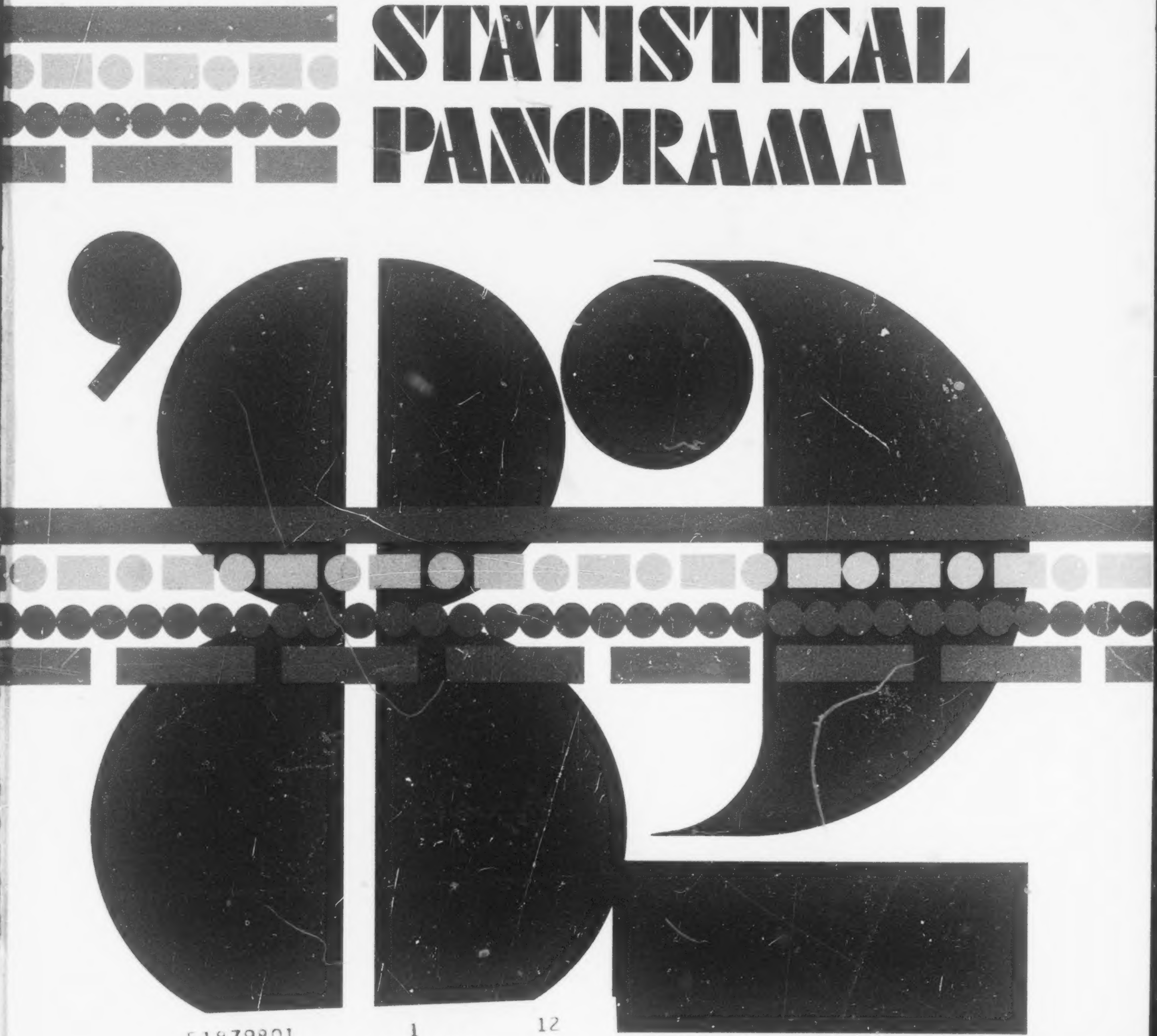

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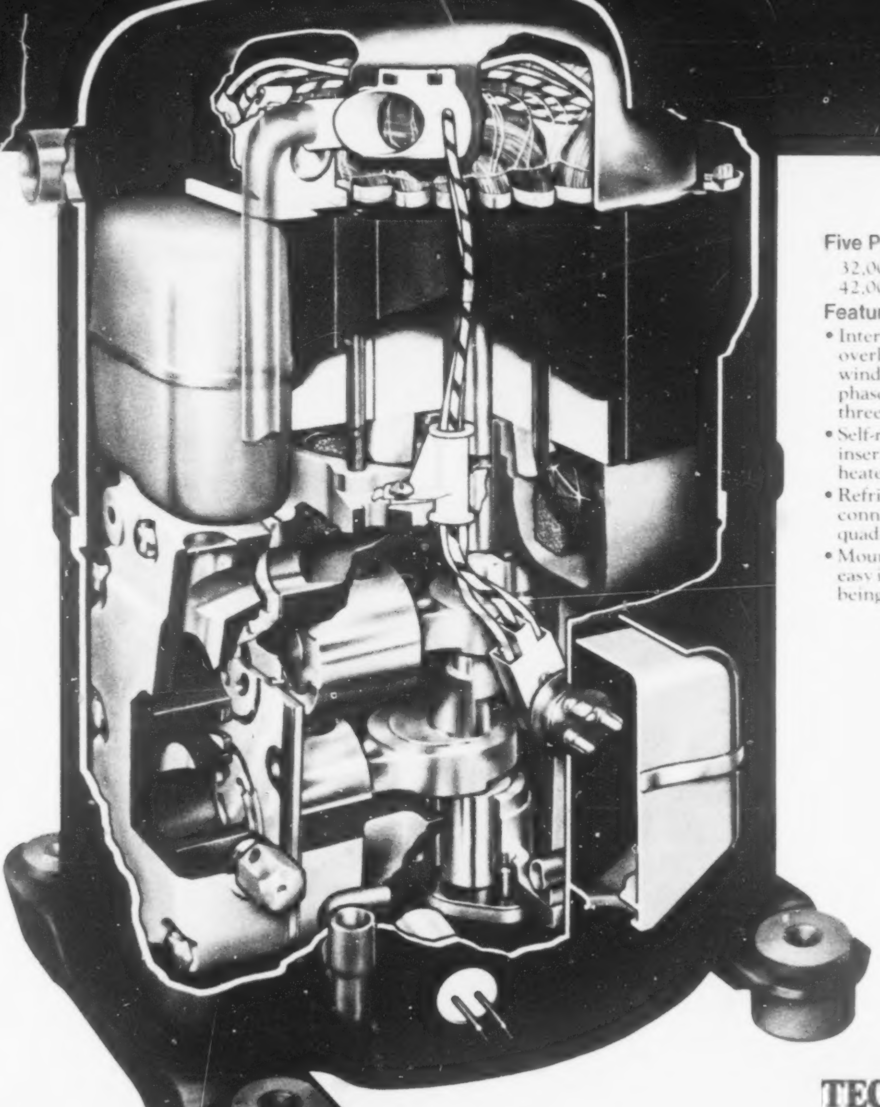

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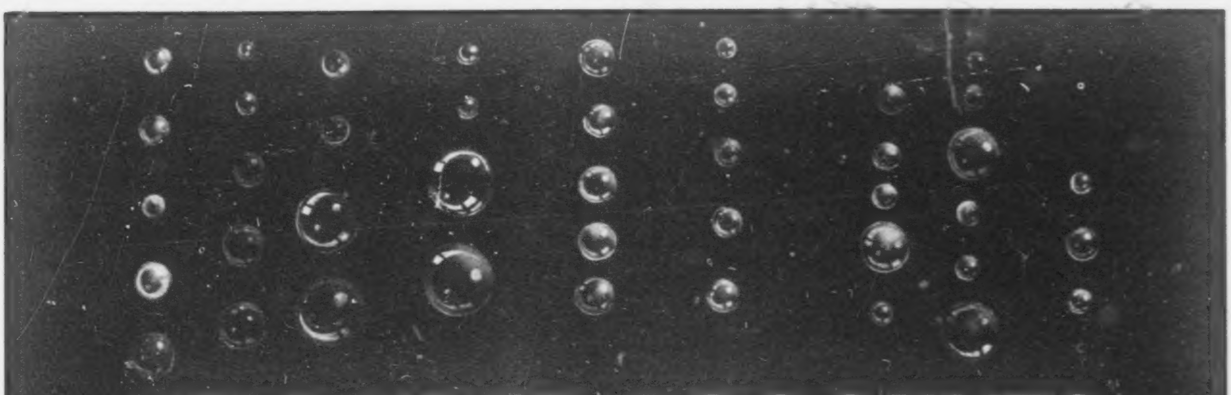

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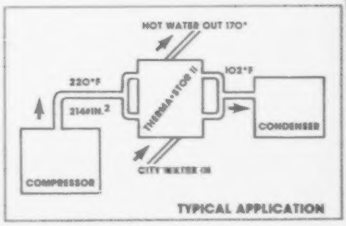

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STATISTICAL PANORAMA

by Gordon D. Duffy and Thomas A. Mahoney

Forecasts

AIR CONDITIONING

Helped by high penetration in the top 10 housing markets, growing replacements, and a utility-encouraged movement to replace for reasons of efficiency, unitary air conditioner shipments increased by 9% last year. The same reasons hold true for 1982 and, with a few more housing starts to help erode an inventory nearing its limit, shipments should hold steady at 2,350,000 units.

HEAT PUMPS

Despite the widespread availability of natural gas, heat pumps have held on to their 24% share of the single-family home heating market. Add about a 21% penetration of multifamily homes and a fast-growing add-on (to fossil fuel-fired and electric furnaces) market and there should be no real difficulty in holding on to 1981's gain of 14% in shipments. The total should be about 500,000.

FURNACES

Although housing starts were dismal, shipments of gas, oil, and electric furnaces held almost even last year, thanks to a steadily increasing replacement market based as much on efficiency improvement as on replacing worn out units. An improvement in housing starts should help push that total up 7% to 1,850,000 units this year. Most of that help will come from gas while electric furnaces hold steady and oil units slip a bit.

BOILERS

Residential boiler shipments dropped 32% last year to levels we consider normal for this product group. Shipments have been pushed abnormally high for three years to provide for the now-dwindling conversion market of oil to gas. They should remain level at about 250,000 units this year. Commercial-industrial boiler shipments, which sagged 12% last year, probably will drop another 10% in 1982.

CHILLERS

The office building boom which brought chiller shipments out of the doldrums has crested and, last year, chiller shipments slipped 6.5%. Office building construction will decline a bit more in 1982 and, despite continued strength in overseas markets in the face of a strong American dollar, chillers will drop by another 5% to 13,100 units.

ROOM AIR CONDITIONING

Room air conditioning shipments recovered by 15% last year even though the economy at home was so-so and competition abroad, where Japan has toppled the U.S. from the position of the number one exporter of room units, has been stiff. A worsened economy at home and continued stiff competition abroad will keep room unit shipments even at 3,700,000 units this year—although a hot summer will add to that total.

COMMERCIAL REFRIGERATION

The maturity of the supermarket industry in many parts of the country, together with the combination of ultra high interest rates and low profits in the retail food industry generally, are factors which have not been kind to commercial refrigeration. Shipments were down 8% last year but, in 1982, shipments should be down only 5% and dollars should be more than even.

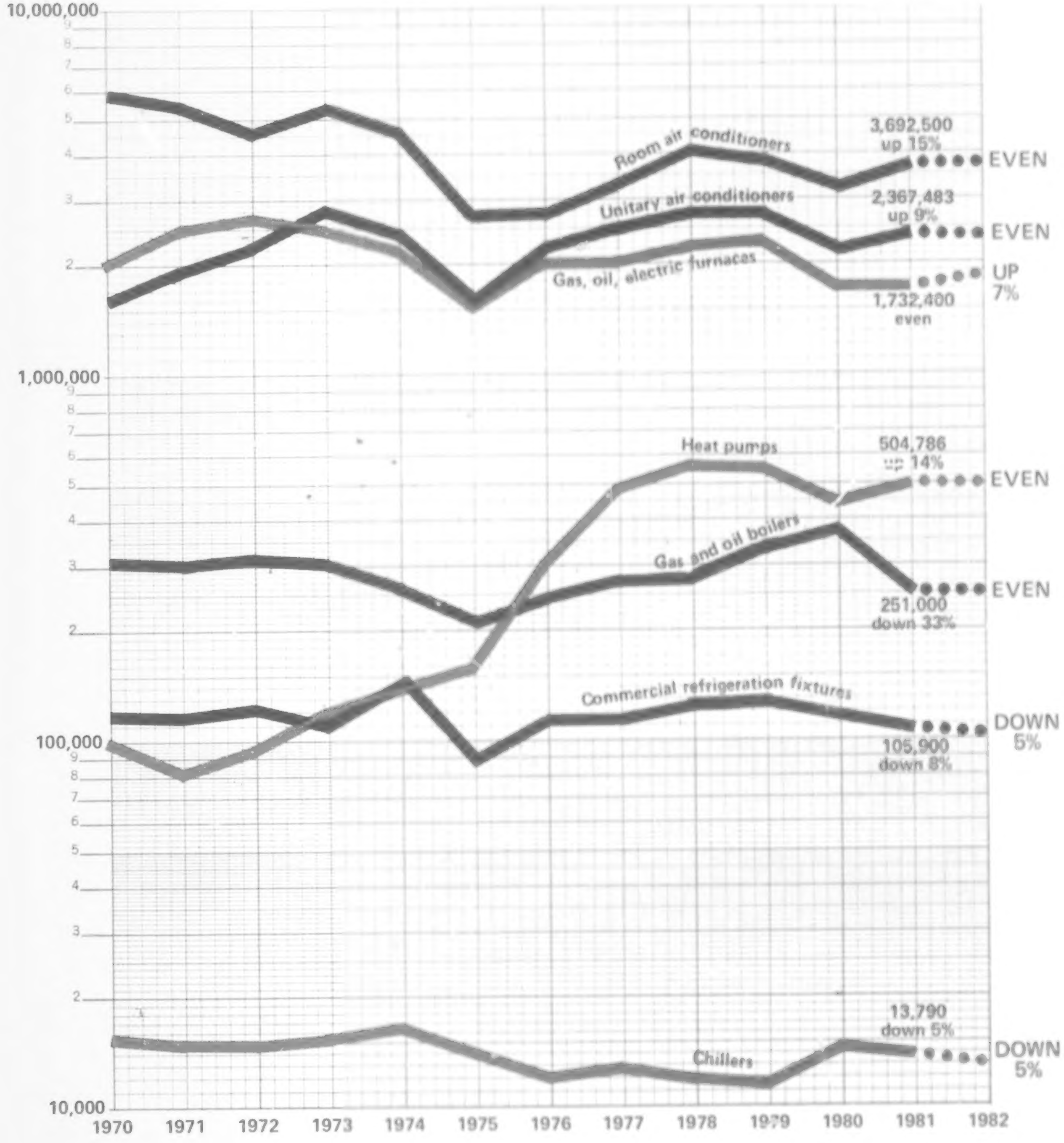
HOUSING

Now in the midst of the longest running and most devastating recession since World War II, the housing and thrift industries will almost certainly get help from the federal government that will help boost housing starts to 1,300,000 this year—although much of it will come too late in the year to be of much help to the home comfort industry. Look for 825,000 single-family starts, up 17%, and 475,000 multifamily starts, up 25%.

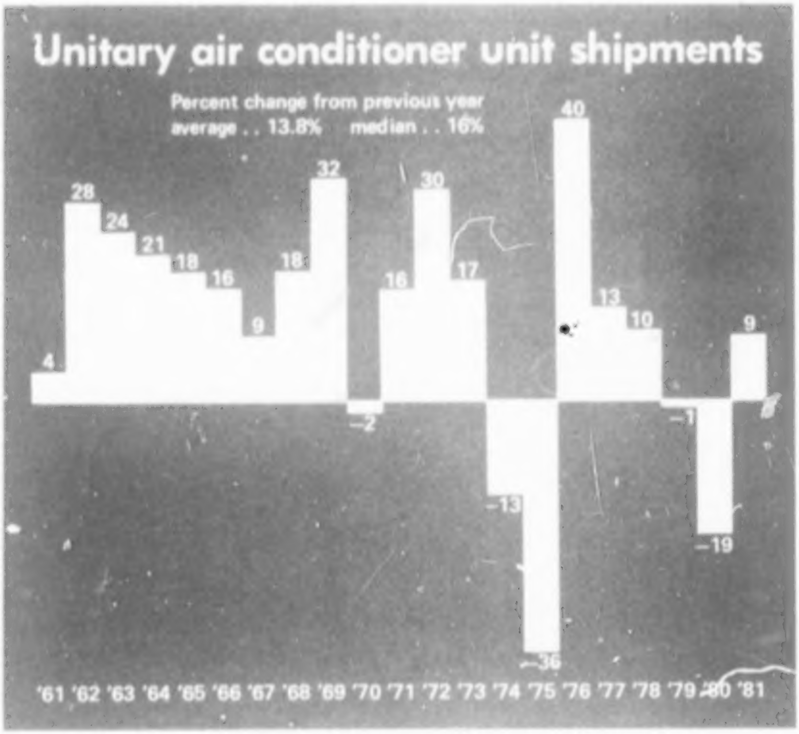
REPLACEMENTS

"Replacements saved our hide," was a frequent refrain during 1981 and it will be repeated just as often this year. By our estimates, central air conditioner replacements increased by 48% last year; more than half of gas furnaces and most residential boilers and oil-fired furnaces are replacements. Not only are markets maturing, but replacements for the sake of improving efficiency are growing rapidly.

Industry trends



1982 in perspective



How many times in the past few years have you heard "the upturn will come in the third quarter" or "when the economy bounces back after the turn of the year?" Or perhaps it was "interest rates will take the steam out of the economy by the fourth quarter."

It's a litany that has prevailed, in one form or another, over the past two years. And it's true again this year. The economy turned down in the fourth quarter of 1981 and won't start back up again until at least the third quarter. By the end of the year, it still will be 1% shy of year-end 1981 levels.

What's more, we expect the same scenario to extend into the foreseeable future — small gains that soon bang their heads against a ceiling of tight credit and high interest rates. The ceiling is fashioned, not by runaway demand, but by Federal Reserve Board policy not to increase the money supply and by federal deficit spending that erodes the capital available to business and industry.

But don't despair.

The residential comfort heating-cooling industry, thanks to a wave of replacement sales that are driven as much by demands for more efficiency as they are by a need to replace worn out equipment, is on a high plateau that promises to continue through 1982 and beyond. The commercial market, too, is holding up well and should only slip by 10% or so.

The industrial refrigeration market should hold even this year, helped by food processing expansion, and help from convenience stores and fast food restaurants should stem part of the commercial refrigeration market slide to about 8%.

All of this has come despite a new home market that is in the midst of its most devastating slump since World War II. The total of 1,086,600 housing starts last year, the third decline in as many years, has left the home building industry in disarray and thrift institutions near collapse.

In making our forecasts we made the assumption that President Reagan will adopt at least some of the recommendations being put to him by a special cabinet task force assigned the job of finding some solution to the housing industry plight (see Housing in Construction). Included, too, is action by Congress on

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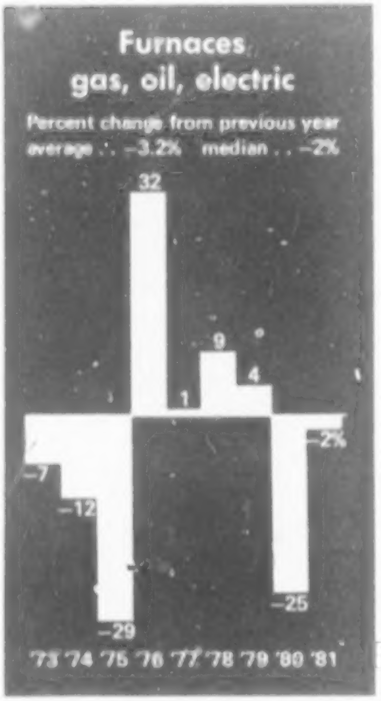

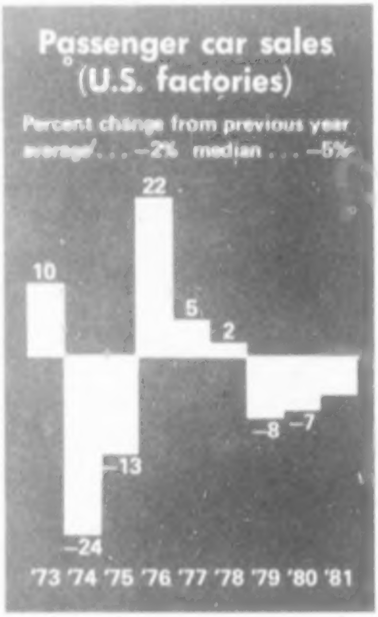

DOWN WITH FANS,
AWAY WITH PLENUMS,
UP WITH EFFICIENCY.

INTENTIONAL
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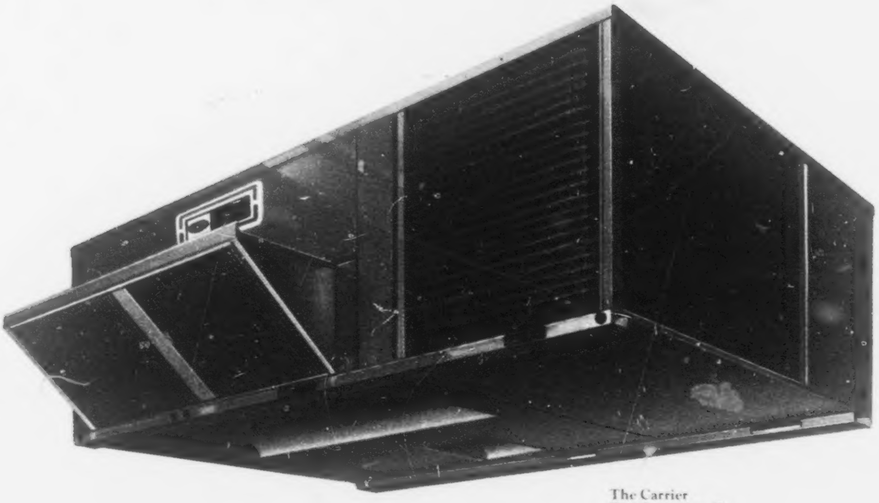
INTRODUCING ANOTHER CARRIER



The Carrier
Weathermaker One
Model 50CD006

NEW FEATURES.

- No plenum.
- Repositioned fan.
- Direct-drive fan motor.
- Easy on-site Economizer installation.
- Integrated energy Economizer.
- Single point power entry.
- Computer programmed balance between compressor, condenser and evaporator.
- No duct connections required on the unit.
- Strongest, most weather-resistant chassis ever.

THE S.E.E.R.

We're not talking through our hats here. The Weathermaker One has the highest SEER we've ever offered for commercial air conditioning of this capacity:

8.4

AS OF JANUARY 1,1982:

Carrier begins the new year with a bang: by introducing the Weathermaker One, the 5-ton air conditioner that does away with the plenum. This new rooftop packaged unit means savings for anyone planning to build offices, shopping centers, supermarkets, banks, restaurants, hotels, factories, fast-food stores, showrooms, theaters, etc. In this ad we'll tell you how the Weathermaker One will give you top performance and save you money — at the same time.

THE PRODUCT.

The Weathermaker One is radically different from any 5-ton rooftop packaged unit you've ever seen. It's both simpler and more sophisticated.

Here's what's different.

It's lighter in weight and more compact. Because it hasn't got a plenum.

It's more efficient because it has got dedicated downshot air delivery.

It's more economical for lots of reasons.

When you use it with an Economizer you get complete economical control through continual adjustment to outside air conditions. And the Weathermaker One benefits from an exclusive Carrier-designed computer program that creates an optimum balance between compressor, evaporator, and condenser.

It's more flexible. You can order accessories installed at the factory — or install them quickly on the job.

It's even adaptable for use as a replacement for traditional horizontal discharge units.

Read on, and find out more about each of these features.

EASIER TO INSTALL.

It's the easiest unit you've ever put on a curb.

The curb is prefabricated and ready, with the neoprene seal strip in place. The ductwork attaches right to it.

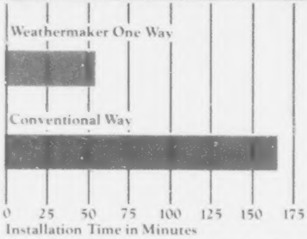
The Weathermaker One is lighter and more portable; it doesn't even need a spreader bar for the lift.

Its chassis is strong, made to take the knocks and jolts of delivery, with pre-drilled lifting holes in the base rail. No rooftop packaged unit is easier to install than the Weathermaker One.

THE DATA.

MODEL:	50CD006 WEATHER-MAKER ONE
TYPE:	Single Package Cooling Rooftop
CAPACITY:	61,000 BTU/hr. total gross cooling
SEER:	8.4
CFM RANGE:	1500 to 2500 delivered air
STATIC PRESSURE:	.75" ESP
REFRIGERANT:	R-22
UNIT DIMENSIONS:	68¾" L × 44³⁄₁₆" W × 29⅛" H
UNIT WEIGHT:	480 lbs.
UNIT COLOR:	Carrier Sea Spray Green
VOLTAGES:	230 volt, 1 phase, 60 Hertz 208/230 volt, 3 phase, 60 Hertz 460 volt, 3 phase, 60 Hertz
ELECTRIC HEAT OPTIONS:	6 Sizes: 7.4 to 24.6 KW
CURB DIMENSIONS:	58" L × 33" W × 14" H
MAXIMUM DUCT SIZES:	To 34½" × 14½" (Supply and Return)

CHEAPER TO INSTALL.



Note: these are approximate times based upon actual installations of rooftop units and related accessory items.

High installation costs are suddenly a lot lower when you're putting in a Weathermaker One. For one thing, the ductwork can be completely finished prior to Weathermaker One's delivery. So you save on sheet metal cost. And your electrical contracting cost will also drop dramatically because of single point power entry — which makes utility connection swift and simple. No downshot rooftop packaged unit is less expensive to install than the Weathermaker One. The installation time on the accompanying chart includes ductwork connection, unit placement, Economizer placement with wiring, and electric heater with wiring. That's pretty well the total installation time — a change from 165 minutes to 55 minutes. Now, you translate that into dollar savings.

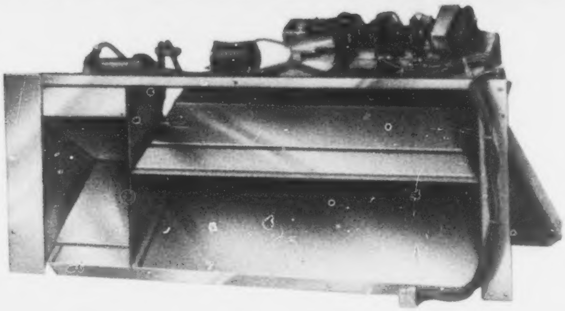
ENGINEERING.

We've eliminated the plenum by moving the position of the fan. So simple. Well, yes and no. The idea is simple enough, and it's been around for a while. However, it took Carrier engineers to get it off the drawing board and on to the roof. And it took Carrier's financial clout to underwrite all the new manufacturing requirements.

In fact, we figure it might take any of our competitors at least 18 months to follow this act.

FIRST: THE WEATHERMAKER ONE.

THE ECONOMIZER.

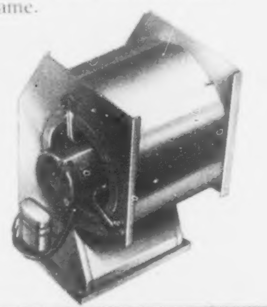


It's not a new feature. But it has been made easier to install — so easy anybody could do it. You slip the Economizer into a special slot on the Weathermaker One, make the electrical hookup in an instant, attach the hood, slide the filter in, and clip on the damper shield. And that's it. Or, if you want we'll do it for you at the factory. What is new is that the Weathermaker One's Economizer accepts enthalpy control — the first Carrier 5-ton unit to do this — so it can operate on a weather-permitting basis. On a perfect spring day, for example, the Weathermaker One will use only outside air. On a day that is too hot, or too humid, the Weathermaker One's compressor will go to work — but just enough to deal with the problem.

Our computers show that our integrated energy Economizer permits an energy savings of 10% to 40% over conventional Economizers.

DEDICATED DOWNSHOT.

If you think that's a fancy name for a piece of technology, take a look at what it does: the Weathermaker One's new fan position allows for a direct downward thrust of air. Which means: no more complicated turns through the plenum, less static resistance, easier delivery of treated air to the outlet, less mileage on the fan motor, and less energy spent. For doing all this, we feel the process deserves its fancy name.



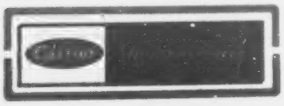
COMPETITION.

THE SAVINGS.

You already know how cost efficient the Weathermaker One is to install.

But that's just the beginning.

Of course, the dedicated downshot is our star efficiency feature, but the supporting measures are no mean feats, either. We've planned the Weathermaker One so that all the different models will use many common parts. Which allows us to make longer production runs. Which allows us to pass the savings on to you.



We've especially designed a computer-balancing program to provide optimum cooperation between the unit's compressor, evaporator, and condenser.

And because we're just as concerned about energy as the next guy, we've fixed things so that the Weathermaker One operates on a weather-permitting basis (thanks to its integrated energy Economizer).

THE PRICELESS INGREDIENT.

It's neither specific nor measurable. Look at some examples of it. We test each unit design in simulated wind and rain conditions. We subject it to a grueling fatigue failure test, and then to an electrical and temperature test.

Carrier
Carrier

We put in a new, raised structural compressor mount instead of just a few bolts to the base pan. We made vinyl- covered cap tubes to keep them from wearing thin just in case of a rub.

To prevent shipping damage, we've recessed the fins, wrapped the unit in heavy plastic, and added a top skid that serves as a rigging spread bar.

Figured out the priceless ingredient yet? It's Carrier quality.

THE SEALS.

Naturally, we've got them. The Weathermaker One is UL listed and ARI certified.

The book.
Or better yet, the movie.

50CD006
ACH&RN-4/5

There's literature available with diagrams and specs on the Weathermaker One. And there's a movie, too.

If you would like a brochure, complete the coupon and send to: **Carrier Air Conditioning, P.O. Box 4808, Syracuse, N.Y. 13221**

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Kansas	Salina	(913) 827-9426
	Wichita	(316) 265-4241
Louisiana	New Orleans	(504) 733-8480
	Shreveport	(318) 222-2611
Maryland	Baltimore	(301) 866-6850
	Beltsville	(301) 937-0182
Massachusetts	Boston	(617) 868-2300
Michigan	Detroit	(313) 522-5000
	Grand Rapids	(616) 942-0610
Minnesota	Bloomington	(612) 884-2981
Mississippi	Jackson	(601) 354-8787
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	St. Louis	(314) 535-4910
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Nebraska	Omaha	(402) 334-2277
Nevada	Las Vegas	(702) 736-7286
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New Mexico	Albuquerque	(505) 344-3551
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	New York City	(212) 392-9120
	Rochester	(716) 424-3140
	Schenectady	(518) 372-4751
	Syracuse	(315) 451-2660
N. Carolina	Charlotte	(704) 394-7311
	Greensboro	(919) 299-3132
	Raleigh	(919) 829-2153
N. Dakota	Fargo	(701) 293-5411
Ohio	Cincinnati	(513) 891-1600
	Cleveland	(216) 881-7800
	Columbus	(614) 272-1333
	Dayton	(513) 294-3632
Oklahoma	Oklahoma City	(405) 525-2551
Oregon	Portland	(503) 620-1870
Pennsylvania	Camp Hill	(717) 761-2242
	Philadelphia	(215) 879-7600
	Pittsburgh	(412) 281-6545
	Wilkes-Barre	(717) 824-4951
S. Carolina	Columbia	(803) 799-8512
	Greenville	(803) 288-2556
Tennessee	Knoxville	(615) 577-1221
	Memphis	(901) 396-7210
	Nashville	(615) 256-1176
Texas	Amarillo	(806) 371-3320
	Beaumont	(713) 866-1442
	Dallas	(214) 258-0340
	El Paso	(915) 779-6100
	Fort Worth	(817) 332-9132
	Houston	(713) 869-3511
	Lubbock	(806) 765-8177
	San Antonio	(512) 824-7261
	Wichita Falls	(817) 723-2929
Utah	Salt Lake City	(801) 972-4034
Virginia	Norfolk	(804) 857-0261
	Richmond	(804) 355-0651
	Roanoke	(703) 343-8254
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	Spokane	(509) 326-1711
W. Virginia	Charleston	(304) 345-2385
Wisconsin	Madison	(608) 271-7500
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UNITED TECHNOLOGIES
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AIR CONDITIONING

Carrier®

FROM PAGE 10

thrift industry survival proposals. An election year is the catalyst.

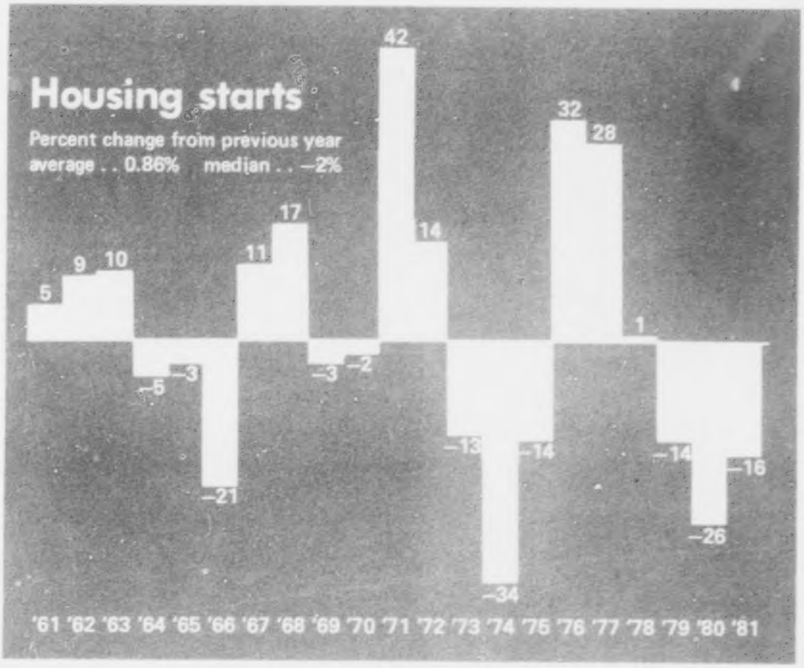
Unitary air conditioning shipments increased by 9.3% last year to 2,367,483 units mostly on the strength of inventory build-up. We think that a figure of 2,350,000 will hold again this year with the forecast small increase in housing starts and the sustaining strength of replacement sales. The add-on market will continue weak but shipments of commercial units will be only slightly behind last year's levels. Inventories will be lean again at year-end.

Shipments of heat pumps, which staged a 14% comeback last year to 504,786 units, also will hold even at 500,000 units in 1982. Although still largely a new-home product, we suspect that a growing application of add-on heat pumps to electric, oil-, and LP gas-fired furnaces are giving this product added strength.

Other increases are expected from water-source heat pumps and from air-to-water heat pumps used for domestic hot water heating but, because of their relatively small numbers, they will not have a great impact on the total market.

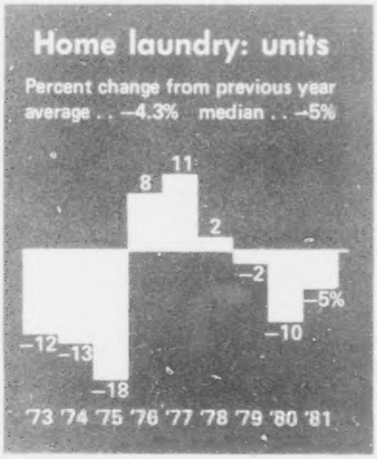
On the heating side, which has traditionally followed housing starts closely, the mold may be breaking. High fuel prices appear to be motivating a growing number of homeowners to upgrade their heating system before it wears out. It's a trend that is accompanied by the availability of equipment which offers quantum leaps in seasonal efficiencies.

Gas furnace shipments, at 1,416,700 units last year, held to within 2% of the 1980 level. They should increase by about 10% this year. Oil furnaces have survived the conversion-to-gas panic and bounced back by 28% last year to a still-depressed 81,200 units. They shouldn't drop more than 10% this year. Electric furnaces, helped by heat pump gains, should remain steady for another year.



Housing starts

Percent change from previous year
average . . 0.86% median . . –2%



Home laundry: units

Percent change from previous year
average . . –4.3% median . . –5%

Residential boiler shipments, which dropped 32.7% last year to 251,000 units, also are returning to normal after the conversion-to-gas phenomenon forced gas boiler shipments abnormally high for three years. They should hold to within 10% this year.

Efficiency

It should be noted, too, that the movement to replace older, less efficient equipment purchased when energy costs were low is strong in both the heating and cooling markets and is growing stronger. It has demonstrated a remarkably strong resistance to the high interest rates prevalent today.

For many years, the nation accepted the atmospheric gas furnace with a standing pilot as the standard. Then consumers, helped by fuel prices and state regulations, began adding spark ignition and flue dampers. Today, however, other options are available ranging from power burners through recuperative and pulse combustion units. Seasonal efficiencies now run from the 50%

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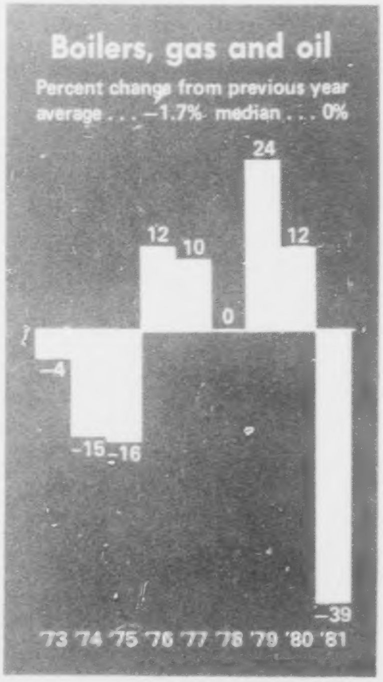

Boilers, gas and oil

Percent change from previous year
average . . . –1.7% median . . . 0%

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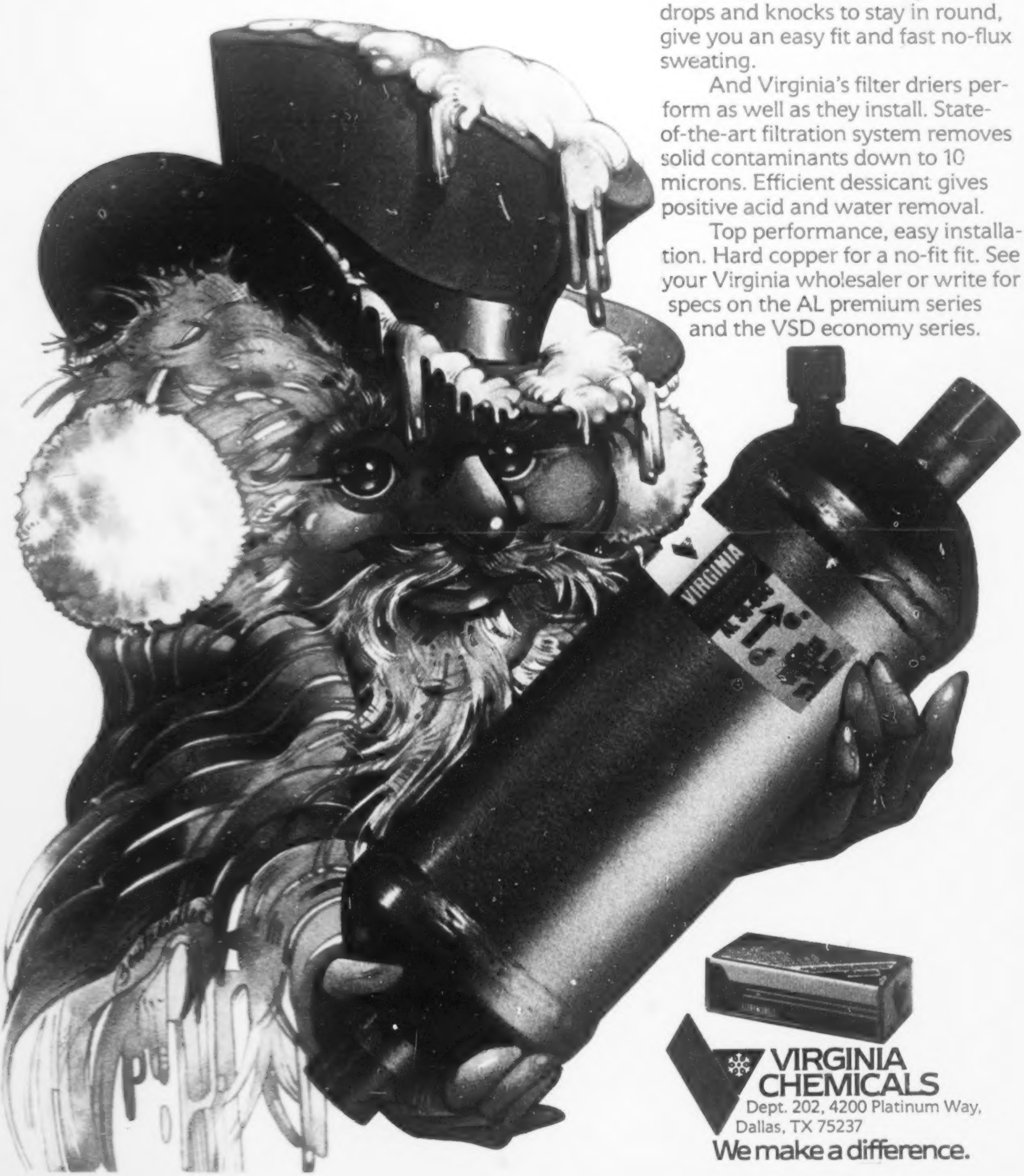

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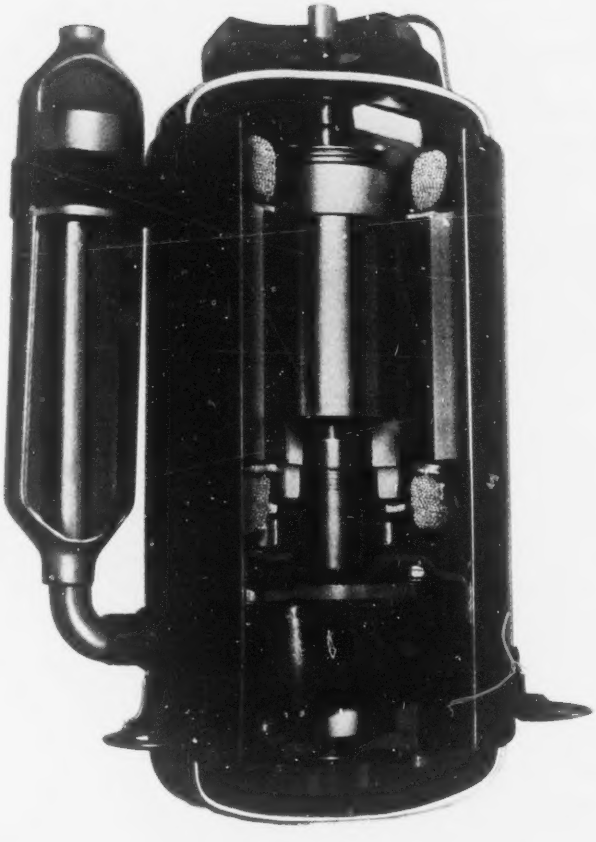

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The Japanese are promoting the advantages of the rotary...the rest of the world is sold. But you've got to maintain your market share. And that's where Rotorex can help. Because we offer the broadest line of 50 Hz. rotary compressors in the world. If you've got products for overseas markets, we've got the rotaries to make them competitive.

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4. Only three moving parts... so there's less to go wrong.

And a lot less to wear out. Linear motion is virtually eliminated. Suction is continuous. (No suction valve, so slugging is not a problem.) And we build extra durability into every critical part. Like our super-bonded gas-cooled motor, our aerospace main bearing system and our precision-hardened roller and shaft. It means less power consumption. And less chance of failure.

5. Bump it, bounce it, bang it...you won't break it.

That's not to say you can't break one of our compressors...you probably can. But the Rotorex compressor may be the toughest compressor ever. There's no need for internal spring suspension. A jolt that would send an ordinary compressor crashing destructively against its shell won't even rattle a Rotorex. They're proven reliable in the toughest vehicular applications. Use them in tanks, in trucks, in boats, trains and planes. If you want ruggedness and reliability, you want a Rotorex rotary.

6. Cuts size... cuts weight...cuts costs.

Check out the savings yourself. Match it BTU per BTU, dollar per dollar, against high efficiency reciprocating compressors. A comparable Rotorex compressor comes out ahead. And it will be about half the size and weight. So you'll see additional savings reflected in reduced shipping and handling costs from the time you accept shipment, to the time your customer does. Our compressor can raise profits...without raising prices.

*Rotorex—a new name for rotary excellence.

"Fedders Compressor Company" just doesn't reflect our status, anymore. As world-wide acceptance of our products has grown, we've been changing to meet the demands. In fact, our entire orientation is now quite different from the way it was just 5 years ago. Because ever since we started manufacturing rotary compressors for outside customers, we've grown at a phenomenal rate.

So we've had to change almost everything about the way we do business. We've changed our internal structure. Established separate manufacturing, marketing and financial organizations. And thoroughly beefed up our sales and service departments to take care of customers here and abroad. Today plans are underway for a multi-million dollar plant expansion to meet projected requirements.

Rotorex is the name we've chosen to reflect the difference in where we are now...where we're headed, and the excellence of our products. Rotorex. We're already a world leader in rotary technology. Ready to serve you...and to save you money. Call us for more information.

ROTOREX

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range to the 90% range.

There are signs that consumers, faced with a major repair or irked by fuel bills, are electing to replace their old furnace or boiler with a more efficient model. The oil industry tells us that 80% of today's burner shipments into the new and replacement markets are flame retention head or other high efficiency types.

The efficiency improvements among air conditioners has been dramatic. The Air-Conditioning and Refrigeration Institute (ARI) reported that residential central air conditioners with an EER (energy efficiency ratio) of at least 7.5 accounted for 36% of all residential unitary shipments in 1978. That portion moved to 44% in 1979, to 50% in 1980 — and to 55% on a more stringent SEER (seasonal energy efficiency ratio) basis last year.

That was more than 1 million units with an SEER of 7.5 or above last year. It included 70,500 units with an SEER of 9.5 or more and about 45,000 units with SEER's of 10 or more.

Similarly, residential heat pumps with an EER in the cooling mode of 7.5 or more accounted for 55.3% of shipments in 1980. This proportion rose dramatically to 71.8% last year.

Although the industry has been providing and promoting high efficiency equipment since as far back as 1973, a large measure of credit for the present surge should go to the electric utilities.

In some of the biggest air conditioning markets in the south, for example, a number of utilities are offering homeowners a rebate of $60/ton if they install air conditioners with an SEER of at least 8.5 and $120/ton if the SEER is 10 or more.

Additionally, many gas and electric utilities are aggressively following the residential conservation service (RCS) path forged and then dropped by the federal government. The resulting energy audits serve to inform homeowners on a one-to-one basis about the equipment alternatives available to help solve their high fuel bill problems.

In a survey published earlier this year (Jan. 25), News readers said emphatically that high efficiency air conditioners, heat pumps, furnaces, and boilers would lead the 1982 market. And although the south and west enjoy three-quarters of the new home starts, readers were quick to point out that the move to high efficiency is national in scope.

A two-year tally of fuel prices compiled by the U.S. Department of Labor as part of the cost-of-living index shows that, from December, 1980, to December, 1981, fuel oil prices increased from $1.022/gal to $1.247/gal. During the same period, natural gas rose from $41.60 per 100 therms to $46.369 per 100 therms ($61.246 in the northeast, $36.201 in the west), and 500 kWh of electricity increased from $30.50 to $34.96 ($46.628 in the northeast, $32.343 in the west).

The exclusive availability again this year of figures which allow us to measure comfort heating-cooling and fuel penetration by region for homes built in the previous year (see Comfort in Construction) again underlines the importance of southern markets.

- More than 48% of all homes completed in 1981 were in the south, where 84% of single-family and 96.7% of multifamily homes were equipped with central air conditioning. Heat pumps also captured a 31.6% share of the south's single-family new home market, the same as for natural gas.
- The penetration of central air conditioning into homes built across the U.S. in 1981 was 64.3% for single-family and 84.8% for multifamily units. National heat pump penetration was 24.2%, almost identical with the 1980 experience.
- Electricity continued to be the dominant fuel in single-family homes at 49.9%, half of it made up of heat pumps, but gas accounted for a 41.8% share. Oil slipped to 1.9%, but "other" fuels accounted for 6.4% — and a whopping 15.1% in the northeast market, up from 10.9% in 1980.

But it was a bad year for accessories. Both power humidifiers and electronic air cleaners fell victim to inflationary demands on discretionary income and probably will not fare much better in 1982. Vent dampers, too, appear to have crested as furnaces with alternate efficiency improvements move into the market.

Regulation

The intrusions of the federal government into the residential comfort heating and cooling industry are waning rapidly, victims of budget cuts and effective improvements in efficiency on the part of consumers and private industry.

The stickers and energy fact sheets imposed by the Federal Trade Commission on furnaces, boilers, and room air conditioners are not being used by contractors and have not been kept up to date. Chances are slim now that they will be extended to central air conditioners and heat pumps as originally planned.

The U.S. Department of Energy was to have issued regulations calling for minimum efficiencies for residential heating-cooling equipment and home appliances before the end of 1980 but asked for more time to study the matter. Although there are still no regulations, it is almost certain that marketplace performance and budgets cuts will eliminate the need for mandatory minimums.

Within a few months, the only legacies of an issue which took center stage in this industry's interest for five years will be the DOE test methods, now adopted by industry, and the FTC program. Both of these, too, may go in time. Also virtually dead are DOE's push to develop energy performance standards for buildings and minimum efficiencies for large electric motors. Reports on industrial fuel usage also have been scrapped.

Standing at the crossroads, as it were, are the states. Many, such as California and Florida, have active energy conservation programs — including minimum efficiencies for air conditioners and bans on standing pilots. For most, however, their future aggressiveness will depend in large measure on what happens to federal grants.

Construction values

Construction contracting volume in 1981 totaled $150.2 billion, according to Dodge/Sweet's Construction Outlook, only 2% more in dollars than the $147 billion recorded the previous year. The 1982 estimate of $165.3 billion, up 10%, will be mostly eaten away by inflation.

The stars of last year's performance were office buildings, which accounted for $19.2 billion and 317 million ft², a 30% increase in real terms (ft²) over the previous year. The peak of the previous office building boom, in 1973, accounted for 195 million ft².

Although we don't think the pace

of 1981 can be maintained this year, a drop of 10% in real terms to 285 million ft^2 is a strong possibility, especially in the light of year-end chiller bookings. Office buildings have been obtaining much of their financing at below-market rates from foreign sources.

Light commercial construction, which dropped about 5% in 1981, probably will hold even in dollars this year but slide by from 5% to 10% in real terms.

Industrial construction, which gained only 4% last year, shows promise of a 25% increase in 1982 in response to government depreciation and tax incentives.

In the institutional field, educational facilities slipped by 12% in 1981 and will be lucky to stay even this year. Hospitals, the only bright spot in an otherwise dismal medical health sector, increased by 12% last year and should show a similar gain in 1982.

Public building construction, which dropped 6% last year from 1980 levels, is expected to decline by 12% to 15% in 1982 despite increased defense expenditures.

The economy

Despite a 1.95% increase in the gross national product (GNP) last year in terms of constant 1972 dollars, another recession arrived in the fourth quarter. It is expected to bottom in the second quarter of this year, but recovery will be slow and still will be 1% shy of 1981 levels by year's end.

In fact, 1981 will mark the third year in a row that the national economy has been at a virtual standstill in real terms.

Recoveries in the first and third quarters of 1981 helped to provide the overall increase in 1981 GNP to 1.95% from $1,480.7 billion to $1,509.6 billion (in constant 1972 dollars). In current dollars, the figures were $2,626.1 billion in 1980 and $2,922.2 billion in 1981.

As much as a 5% improvement is forecast for 1983, but this will depend in large measure on Federal Reserve Board policy and on the ability of Congress to manage budget deficits in the face of continued high unemployment and near-static revenues.

If there was a bright spot, it was that the Consumer Price Index (CPI) increased by only 8.9% last year after increases of 12.4% in 1980 and 13.3% in 1979. The outlook for 1982 is for an even more modest increase of about 7%.

Some of the glitter disappears from the relatively low CPI figures, however, when it is remembered that high unemployment and a recessionary economy were its chief architects. Home purchase expense (up 1.2%) and food (up 4.3%) were balanced by a 17.9% increase in home financing and operating costs, a 13% increase for services, and 12% increases for energy and medical services.

And although total personal income increased 11.3% from $2,106.2 billion in 1980 to $2,403.6 billion last year, per capita real disposable income (in constant 1972 dollars) increased by only 1.6% from $4,473 in 1980 to $4,525 last year. In current dollars, per capita personal income was $8,002 in 1980 and $8,768 in 1981. Personal saving, meanwhile, increased by 5.2% from $101.3 billion in 1980 to $101.6 billion last year, expressed in current dollars.

Total personal consumption expenditures, at $1,858.1 billion in 1981, increased by 11% over the 1980 figure of $1,672.8 billion. There was a 9.5% increase in durable expenditures, a 10% increase for nondurables, and a 12.4% increase in money spent for services. For the first time in several years, gasoline and oil expenditures — with a 6.2% increase in 1981 — did not exceed the inflation rate.

Industrial capacity at year's end was 72.7%, down sharply from the 81.4% at year's end in 1980 and just below the 1975 average of 73.4%. New orders to manufacturers, at $159 billion in November, 1981, were slightly below the $163 billion at the same time in the previous year, but the average for the year should have been significantly above the 1980 average of $155 billion.

Manufacturer inventories, at $279 billion in November, 1981, were significantly ahead of the $257 billion at the same time in the previous year. Most of the increase, $17 billion, was in durable goods. Manufacturer unfilled orders, at $320 billion last November, was the same as for November, 1980.

Although figures were incomplete, total consumer installment credit was running 11% ahead of 1980's $305 billion through the first 11 months of 1981 and should reach $340 billion. The increase was shared almost equally by automobile and revolving credit extensions. Also, it would appear that repayments of installment debt, while ahead of 1980 levels in total, will be 5% short of the amount extended.

Productivity, which grew by 2.8% in 1979 only to drop 0.9% in 1980, increased by 2.7% last year, primarily because of increases in the first quarter. When final quarter figures are tabulated, however, this figure probably will be reduced.

Total corporate profits before taxes and adjusted for inventory, increased by 1.5% from $199.8 billion in 1980 to $202.9 billion in 1981. After-tax profits, however, declined by 5.7% from $163.2 billion in 1980 to $153.9 billion in 1981 despite a $5 billion reduction in tax liability. Expenditures for new plants and equipment expanded from $295 billion in 1980 to $322 billion last year and are expected to go to $346 billion in 1982.

The U.S. balance of trade continued on a positive plane during the first nine months of 1981 when compared to the same period in the previous year.

During the same comparable periods, merchandise exports grew 7.7% from $166.8 billion in 1980 to $179.6 billion in 1981, while imports increased only 6.2% from $186.6 billion in 1980 to $198.2 billion in 1981. An 11.3% increase in net investment income, from $24.5 billion in 1980 to $27.3 billion in 1981, together with adjustments for military operations, travel, and pensions, left a positive balance of $8.7 billion. This compares with $14 billion deficits in 1977 and 1978.

When all is said and done, it will be a good year for some but a bad one for others. The shakeout of unitary manufacturers continues. Failures among wholesalers were up 41% in 1980, probably were higher last year. Failures among subcontractors, at 1,164 in 1980, were double the average of the previous few years, according to Dun & Bradstreet. There are indications that the number may have increased by 50% in 1981.

It really depends on what's available for sale where. The industry is fortunate that, with the possible exception of Los Angeles, the top 10 new home markets are all heavy users of air conditioners and heat pumps.

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FROM PAGE 19

In the northeast and midwest, where winters can be severe and fuel costs are high, the replacement markets are showing signs of life despite high unemployment and high interest rates. And in parts of the northeast, where defense and high technology industries are located, even the new home industry is brightening.

For manufacturers, it will be a year of juggling inventories and trying to anticipate demand so that sales are not lost because of short stocks. And, with little growth in the offing, the battle for market shares will continue unabated.

There is no doubt that business conditions could be better. But they could also be a lot worse.

Air conditioning

In a year when the overall economy was suffering, the 9% increase in unitary air conditioning shipments in 1981 was heartening.

The fact that most of the increase came in the form of inventory buildup should not detract from that solid performance. Inventories at year-end still were within reasonable limits and the replacement market — the prime reason for this market segment's strength last year — was holding strong.

Total shipments of U.S. unitary air conditioners and heat pumps in 1981 increased by 9.3% to 2,367,483 units from the previous year's total shipments of 2,166,714 units, according to the Air-Conditioning and Refrigeration Institute (ARI). The increase came despite a new-home market devastated by high interest rates and a summer that, nationally, was only slightly warmer than normal.

These figures do not include 130,000 air conditioning units and air-to-air heat pumps shipped to foreign markets in 1981, down 38% from the 210,000 units exported in 1980. The drop is not nearly so precipitous, however, if it is remembered that the 1980 experience was exceptional and that last year's exports were close to the average for the past decade.

Too, these ARI figures represent only units shipped directly to overseas markets by OEM's (original equipment manufacturers) and include few, if any, units shipped by distributors and contractors.

Of the 2,166,714 units shipped in 1980, about 80% — or 1,728,000 units — were for residential applications and 20% — or 438,700 units — were for commercial applications. This is a slight deviation from the 78%-22% split that has held sway for the past several years.

If we accept that the same split held true for 1981, then 80% — or 1,894,000 units — were destined for residential applications last year, and 20% — or 473,500 units — were destined for commercial applications.

The unitary category includes electric air conditioners, gas air conditioners, air-to-air pumps, and rooftop equipment. It does not include packaged terminal air conditioners (ptac's), room air conditioners, heat pump water heaters, or water-source heat pumps.

Inventory

The inventory of unitary air conditioners at the end of 1981 was 790,000 units, or 33% of shipments that year. This compares to 616,000 units, or 38% of shipments, at the end of 1980. Although this 28% increase in numbers from one year to the next represents an addition of 174,000 units to inventory, it might also be noted that the end-of-1981 value is within the 30% to 33% range of shipments considered normal throughout the industry's history.

Of the total inventory, an estimated 415,000 units, or 52.5%, were at the factory, and 375,000 units, or 47.5%, were at the distributor level. This represents an increase of 112,000 units at the factory and 60,000 units at the distributor level when compared with prior-year experience.

It should be noted that, starting in the fourth quarter of 1981, there has been a significant trend among distributors to reduce inventories. This could have a special meaning for contractors should this spring be abnormally warm or should the housing market break loose faster than expected.

An indication of capacity mix for 1981 unitary air conditioners, and how it compares with 1972 experience, follows:

	% 1972	% 1981
Under 1.8 ton	16	10.2
1.8 ton to 26,999 Btu/h	23	19.9
2.25 ton to 32,999 Btu/h	17	18.6
2.75 ton to 38,999 Btu/h	22	22.5
3.25 ton to 43,999 Btu/h	6	7.7
3.67 ton to 53,999 Btu/h	7	8.5
4.5 ton to 64,999 Btu/h	6	8.2
5.4 ton to 96,999 Btu/h	1	1.7
8.1 ton and larger	1	2.7

There were no significant year-to-year shifts in any classification from 1980 to 1981 in these ARI-supplied figures.

Installed value

The installed value of unitary air conditioning equipment put in place in 1980, the latest year for which figures are available, was $5.19 billion, down 12.6% from the $5.94 billion in 1980, according to ARI.

Commercial installations accounted for $1.83 billion of the total in 1980, and residential installed value amounted to $3.36 billion, according to estimates compiled by ARI's

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FROM PRECEDING PAGE

Business Research Department from information supplied by manufacturers.

Installed value covers the cost of unitary air conditioning equipment as shipped from the factory together with labor, ductwork, registers and grilles, thermostatic and other controls, electrical wiring, and other components of the system that are installed by the contractor.

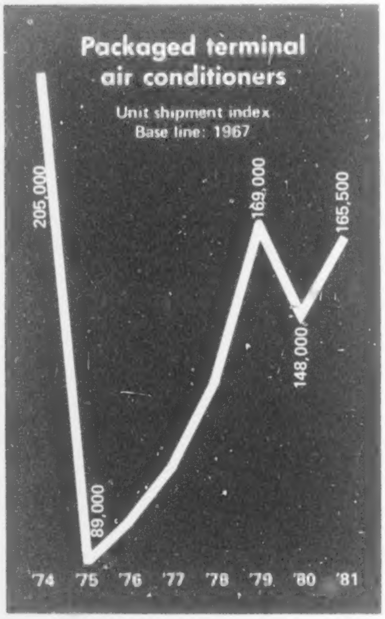
The installed value of field-engineered air conditioning systems put in place in 1980 was estimated at $3.438 billion, an increase of 40.5% over the 1979 figure of $2.44 billion.

The combination of the two installed value figures for 1980 was $8.624 billion for all air conditioning put in place in the U.S. with the exception of room air conditioners. This represents a 2.9% increase over the 1979 total of $8.37 billion.

In determining the installed value of field-engineered systems, ARI estimates that only 7.5% of the cost of the system is represented by the refrigeration machine. The remaining 92.5% represents air-handling equipment, labor, ducts, pipes, controls, and all other installation costs.

Ptac's

Packaged terminal air conditioners (ptac) shipments, which recovered steadily from a precipitous early 1970's drop until another setback in 1980, increased by 11.8% in 1981 to 165,500 units from a revised 1980 figure of 148,000 units. Shipments in this category had climbed from 89,000 units in 1975 to 169,000 units in 1979.



The recovery of ptac's was a reflection of the recovery of the office building, nursing home, and hotel-motel markets as well as the growing strength of heat pump versions. It is doubtful if the increase can be sustained in 1982 in the face of commercial market declines caused by high interest rates.

The News continues to feel that more than one-third of the ptac's shipped were heat pumps. We also feel that this proportion will grow to two thirds within the next three or four years.

Ptac's are self-contained refrigeration cycles capable of being combined with a heat source, usually electric resistance heat or hot water coils, in the same through-the-wall cabinet. The heat pump version uses outdoor air as a primary heat source.

Heat pumps

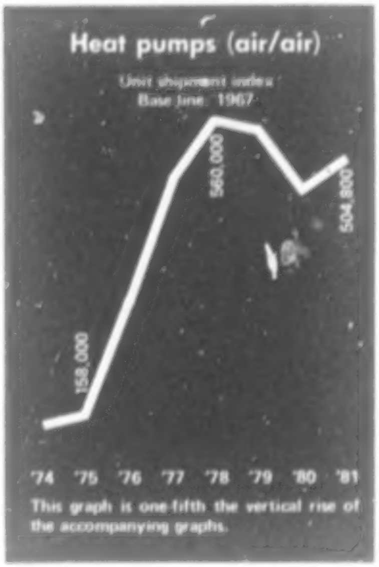
Air-to-air heat pump shipments, which rose from a plateau of about 120,000 units in 1973 to 560,000 in 1978 only to drop to 442,829 units in 1980, staged a 14% comeback last year to 504,786 units.

There are many reasons for the continued strength of the air-to-air heat pump market beyond increased reliability and a much more widespread contractor familiarity with the special system design and application needs. The heat pump also is expanding greatly its former role as the product of the south and new home markets.

Heat pumps continued to capture 24% of the new single-family home market in 1981. But because of the 17% decline in this already depressed market segment, it absorbed 35,000 fewer heat pumps. Although no statistics are available to verify our suspicions, we expect that part of this deficiency was picked up by the multifamily segment of the new residential market.

The net gain of nearly 62,000 heat pumps also can be explained partly by an increase in inventory levels. But we suspect that two other factors played a major role.

In homes equipped with electric or oil furnaces together with air conditioning, there has been a noticeable trend toward the replacement of the air conditioner with a heat pump in order to reduce winter heating costs. Too, the movement toward natural gas for heating has been slowed by rapidly increasing gas prices in many areas coupled with public speculation about the decontrol of gas prices and what it will mean for consumers.



This graph is one-fifth the vertical rise of the accompanying graphs.

The air-to-air heat pump figures included in the unitary statistics supplied by ARI do not include all heat pumps made in the U.S. To these should be added ptac's in a heat pump configuration, water-source heat pumps (two categories which also increased shipments last year), air-to-water heat pump water heaters, and room unit heat pumps.

The Association of Home Appliance Manufacturers (AHAM) does not break down its shipment figures into air conditioner and heat pump categories. The News estimates the heat pump share to be in the order of 15% to 20%.

Water-source units

Water-source heat pump shipments, until five years ago, amounted to a small, steady category of usually less than 40,000 units a year. Since that time, however, shipments have more than doubled, and there is promise that they still may be near the bottom of their growth curve.

These units are not included in

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the unitary total (which includes only air-to-air heat pumps). They have been applied in the deep south for many years. Some are used on closed loops coupled to a small boiler and cooling tower; some use water from a well, a pond, or the ocean; and others use closed ground loops filled with a heat transfer fluid to provide comfort heating and cooling.

Shipments of water-source heat pumps in 1978 jumped 36% to 54,000 units. In 1979 the increase was 28% to 70,000 units and, in 1980, shipments increased by 19% to 84,000 units. Shipments in 1981 increased by 13% to 95,000 units and, this year, should easily top 100,000 despite the economy.

The water-source category includes three classes of systems. The bulk of the shipments are units designed for the southern market which operate on ground water or closed loops in the 60°F to 90°F range. But the fastest growing segment is a class of unit designed for northern climates that can accept water sources as cold as 45°F; we suspect 10,000 to 15,000 of these are not included in the official industry count. A third class developed within the past couple of years are those using vertical or horizontal water-glycol loops with temperatures that go down to 26°F.

The northern water-source units are growing steadily in areas where ample ground water is available. Until recently, however, their market was limited to rural and exurban areas beyond natural gas mains and where energy-source options include electricity, oil, or LP gas. The use of vertical or horizontal ground loops, however, provides the systems with the potential for invading urban markets. Solar assist often is a practical option for closed-loop systems.

Water-source units have advantages over their air-source cousins in that they have no defrost cycle to interfere with efficiency or reliability, they have a predictable worst-case heat output, they can be sized for part or all of the heating load, and they are super-efficient in the cooling mode.

Despite these advantages, however, they are not inexpensive when the cost of providing the water source is considered, their application often relies on an alliance between well drillers and hvac contractors, and each system must be carefully engineered.

Heat pump water heaters

The nation has traditionally heated its domestic hot water with natural gas, electricity, and some oil and LP gas, particularly in the northeast. Increasing energy prices have motivated homeowners to add extra insulation to storage tanks, add solar assist, and to use desuperheaters in cases where the operating hours of air conditioners or heat pumps can justify the extra cost.

A new method, the air-to-water heat pump, is breaking into the market and is aimed primarily at those who now heat their hot water with electricity, oil, or LP gas. It costs more than twice as much as an electric hot water heater to install, but operating savings are in the order of 40% or more. It is competitive with solar, even when tax credits are considered, in both installation cost and in operating savings, and it's easily added on to existing electric water heaters.

There are no statistics for these units, which have only entered the market in the U.S. and in Europe over the past two years. But they do have the potential to become a new market that will rival residential air conditioners in numbers and in importance. Electric water heater shipments in 1981, for example, amounted to 2,450,000 units.

The increased reliability and efficiencies of air-to-air heat pumps, particularly in the cooling mode, together with the potential of their water-to-air and air-to-water cousins, add to to a diverse and solid

Three categories still cloudy after Census Bureau action

Although four new categories of air conditioning and refrigeration products — recreational vehicle air conditioners, water-source heat pumps, screw compressors, and humidifiers — were contained in the latest Bureau of the Census report, only one of the categories contained meaningful figures.

The 1980 Current Industrial Report MA-35M, Air Conditioning and Refrigeration Equipment, Including Warm Air Furnaces, which was issued last November included the new categories in an attempt to clarify a lack of comparability between industry and Census Bureau figures.

The new screw compressor category lists shipments of 11,147 units in 1980, the latest year for which data are available, and 9,965 units in 1979. Both figures appear to be reasonable.

The same report lists shipments for all types of humidifiers, including central and self-contained units, as 347,237 units in 1980. The News feels that, in this first year of data collection, not all manufacturers reported. Perhaps the 1981 data, expected to be ready in December, will be more complete.

Data for recreational vehicle air conditioners was combined with that for horizontal air conditioners under 27,000 Btu/h and data for water-source heat pumps was combined with that for air-source units. The Census Bureau did not explain whether this was done to protect the identity of reporting firms or, simply, because the data did not meet its standards for completeness.

The Air-Conditioning and Refrigeration Institute (ARI) asked the Census Bureau a year ago to check the room fancoil and icemaker categories for possible double reporting on the part of some companies. This happens sometimes when manufacturers used branded products (units built by others but sold by them) to fill out short lines.

The problem is complicated by the confidential nature of individual company shipment figures, which must be respected by those who gather the numbers or the system would collapse. For this reason, the Census Bureau can only ask these companies to check on their reporting methods. It cannot oversee the operation.

base for future heat pump expansion. In addition, the heat pump now is a practical replacement for central air conditioners in most areas of the country for homes heated with anything but natural gas. And, with decontrol within three years, even gas furnaces can become a target for add-on units.

Rooftops

Indications are that commercial rooftop shipments held steady in 1981. The reason we say "indications" is that no official sources attempt to classify rooftops.

Commercial rooftops really represent a market application of several different products rather than a single product type that can be identified statistically.

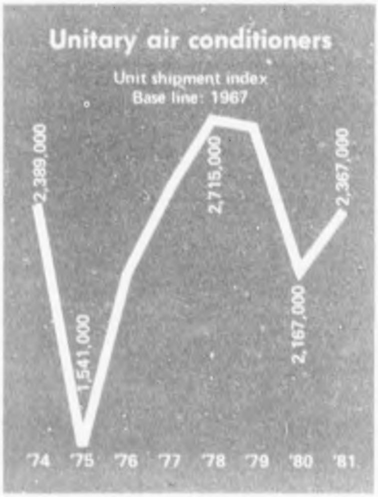
For example, all-year units are identified by the Bureau of the Census and clearly imply a heating capability. However, both single-package and split-system rooftops, although they may have been shipped (and counted) as cooling-only units, may have a modular heating section added in the field.

Too, heat pumps imply one and usually two methods of heating as well as cooling. Another complicating factor is that small, all-year rooftops are applied in more residential than commercial situations.

In the past, we have attempted to apply known ratios from the year-previous Bureau of the Census report to the current ARI-supplied totals for the last complete year of shipment figures. These ratios were clouded, however, by the need to remove exports and other figures (see separate story in this section) to make the two sets of figures agree as much as possible.

This year, however, The News has obtained a breakdown of ARI shipments according to broad system types by size and according to the residential and commercial split. By applying the 1980 experience ratios to the 1981 shipment figures we find that, of the 438,700 commercial units shipped in 1981:

- 139,700 were split systems, of which about 34,000 units had capacities in excess of 5 tons;
- 132,000 were all-year single packages, of which 30,000 units had capacities of more than 5 tons;
- 98,000 were cooling-only air conditioners, of which 27,000 had capacities of more than 5 tons;
- 1,100 were multizones, all of which had capacities in excess of 5 tons; and
- 68,000 were heat pumps — 38,000 single packages and 30,000 split systems — of which 10,500 had capacities in excess of 5 tons.



Taken together, about 103,000 units were commercial rooftops with capacities in excess of 5 tons. Of these, 75,000 had capacities in excess of 11 tons and 10,500 of these had capacities in excess of 20 tons. Heat pumps with capacities in excess of 5 tons accounted for 12.6% of the total.

The total for unitary air conditioners of more than 5-ton capacity shipped in 1981, at 103,579, was 4% ahead of the 99,472 units shipped in 1980.

Mobile air conditioners

According to the Motor Vehicle Manufacturers Association, there were 5,067,613 factory air conditioner installations in U.S. domestic automobiles in 1981, almost the same number as the 5,076,222 factory air installations made in 1980.

The status quo performance came despite a 4.6% drop in U.S. car production from 6,957,191 units in the 1980 model year to 6,639,954 units last year. The difference came from a small gain in air conditioner penetration from 73% in the 1980 model year to 76.3% last year.

Although air conditioning penetration has slipped somewhat from the near 80% it enjoyed only two years previous, it must be remembered that the mix of cars produced now includes a larger proportion of compacts and subcompacts at the expense of standard-sized and luxury cars, many of which include air conditioning as standard equipment.

Additionally, the new car statistics do not include light trucks, of which about 40% are equipped with factory air conditioning. About the same proportion of imported cars and light trucks are air conditioned at the factory.

Aftermarket shipments of auto air conditioners, estimated at about 750,000 units in 1981, are expected to continue their flat 1980 and 1981 performance until the new car market improves, according to both the Mobile Air Conditioning Society and the International Mobile Air Conditioning Association.

It is estimated that, in its peak year 1978, shipments totaled about 1 million units. Many of these, however, were installed on imported cars which now are air conditioned at the factory.

The Japanese have made a significant impact on both the new car and aftermarket aspects of the auto air conditioning market. Sanyo is thought to have close to half of the aftermarket imports, while Mitsubishi is the leader in OEM imports.

On the domestic front, however, Tecumseh is entering the market with a new design, and General Motors may make its new compressor for small cars available to other manufacturers. A major marketing impediment for all, however, is a strong resistance from both factory and aftermarket OEM's to a proliferation of compressor sizes and

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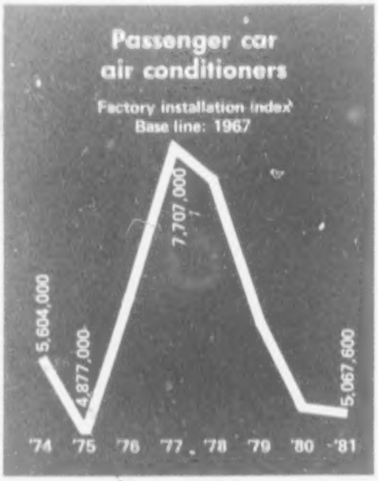

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types.

Although 1981 figures are not available, the Bureau of the Census reported that 7,035,148 automotive air conditioning compressors were shipped from U.S. factories in 1980. There were no comparable 1979 figures.

The Census Bureau also reported that 793,780 mobile air conditioners for trucks, agricultural, and off-highway construction vehicles were shipped in 1980, down 41.3% from the 1,352,198 units shipped in 1979. Similarly, the bureau reported that 5,844,328 mobile air conditioning systems for passenger cars were shipped in 1980, down 23.6% from the 7,651,618 units shipped in 1979.

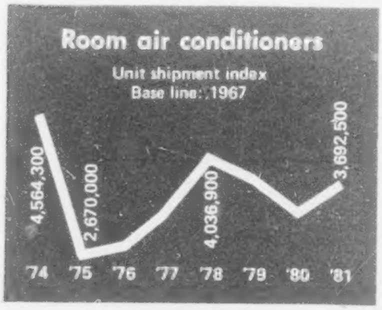
Although the bureau set up a new classification for air conditioners used in recreational vehicles and pleasure boats, there were no 1980 figures because of the possibility of individual company disclosure.

Room air conditioners

Room air conditioner shipments increased by 15.3% to 3,692,500 units in 1981 from the 3,203,500 units shipped the previous year, according to the Association of Home Appliance Manufacturers (AHAM). Both figures are far above the 2.67 million units shipped in 1975, but are considerably below the 5 million-plus years of the early 1970's.

Not to be forgotten, too, is the fact that 713,000 room air conditioners were exported last year, or 19.3% of total shipments. This compares to 805,869 exported units in 1980, or 25% of total shipments. (See the International section for a listing of key export markets.)

Contrary to the expectation of some, high energy costs have not caused consumers in significant numbers to switch from central air conditioning to the more selective room unit approach. Room units remain essentially an impulse purchase influenced more by hot weather than by any other single factor.



A combination of slightly fatter inventories and stiff competition in foreign markets coupled with a strong dollar in relation to other currencies will keep room unit shipments even in 1982. A continued sluggish economy could produce a downturn but, then again, abnormally hot weather could produce a 10% to 15% increase in domestic shipments.

Chillers

Although the slip from 14,530 chillers shipped in 1980 to 13,790 units shipped in 1981 amounted to 5.1%, it must be remembered that last year's total still was considerably above the 1976-1979 doldrums of 11,000 to 12,000 units. The figures include both U.S. shipments and exports.

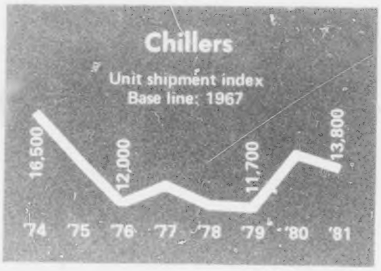
The 4,300 centrifugal chillers shipped in 1981, down 6.5% from the 4,600 centrifugals shipped the previous year, reflected in large measure the strength of the domestic office building market and overseas markets, particularly the Middle East, despite a strong dollar and a Europe in recession.

In 1981 there were 9,250 reciprocating chiller packages shipped, down 4% from the 9,650 reciprocating chillers shipped in 1980. Shipments of absorption chillers amounted to 240 units last year, down 14.3% from the 280 units shipped in 1980. More than half of the absorption units were exported.

For the first time, the Bureau of the Census has listed shipments of screw compressors. It reported that 5,089 screw compressors were shipped in 1980, down 12.7% from the 5,828 units shipped in 1979. These figures, however, are believed to include only those screw compressors formerly grouped with reciprocating chiller packages and not the large-tonnage units still believed to be grouped with centrifugal chillers.

The Census Bureau also reported that 1,860 ammonia compressors were shipped in 1980, down 7.7% from the 2,014 units shipped in 1979.

The outlook is for a drop in chiller shipments in 1982, possibly more than 10%. Even though the office building market was the last to be hot by high interest rates — and is continuing to show surprising strength — it has been slipping since the third quarter of 1981. This factor, coupled with sluggish economies at home and abroad, will have a negative impact on overall chiller shipments this year.



In short, a high level of bookings from 1981 will assure a good first quarter this year, but the decline in bookings will mean fewer shipments later in 1982. It is doubtful that any recovery will be experienced until 1983.

A breakdown by chiller type follows:

Year	Recip.	Cent.	Abs.
1970	10,300	4,150	1,000
1971	10,000	4,000	900
1972	10,000	3,000	900
1973	10,400	4,100	800
1974	11,000	4,500	1,000
1975	8,250	4,950	700
1976	7,600	3,400	500
1977	8,900	3,000	450
1978	8,100	3,350	370
1979	8,100	3,350	280
1980	9,650	4,600	280
1981	9,250	4,300	240

Cooling towers

Although The News has no way of knowing for sure, it believes that shipments of factory-assembled cooling towers have continued on a five-year plateau of within 10% of

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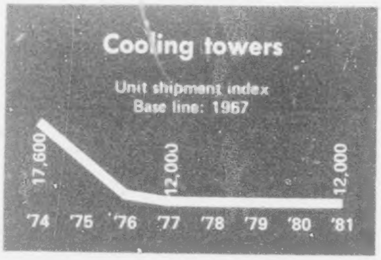

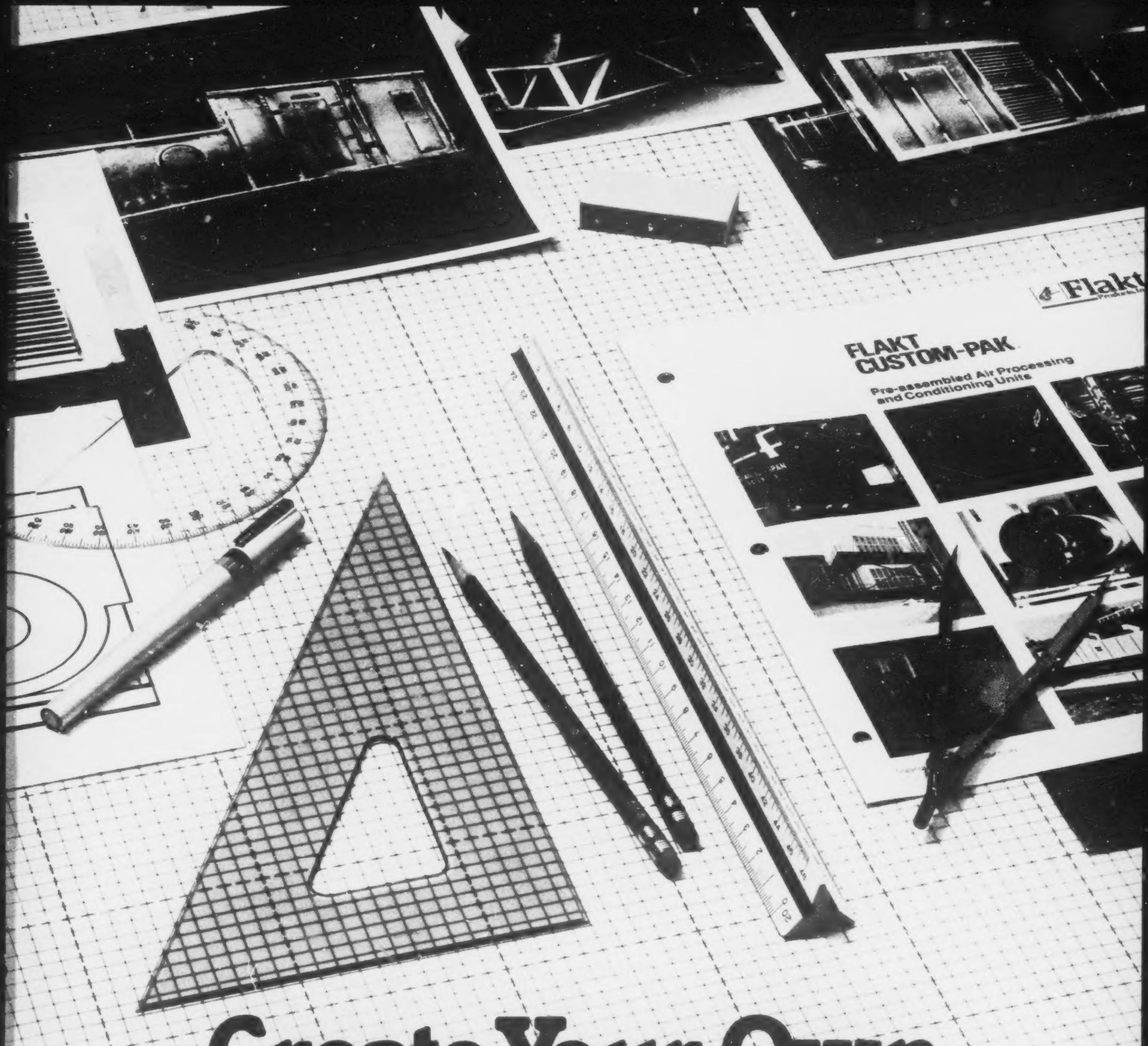

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12,000 units.

The Bureau of the Census reported that 11,951 cooling towers were shipped in 1980 and that 12,168 units were shipped in 1977. There were no reports for the years 1978 and 1979 because publication would have meant disclosing the operations of individual companies.

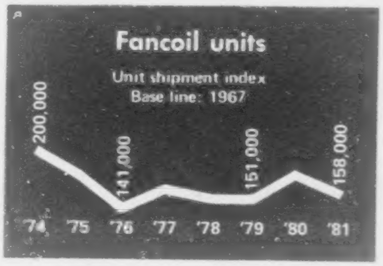
Evaporative condensers

Shipments of evaporative condensers in 1980 amounted to 2,881 units, down 11.7% from the revised figure of 3,263 units in 1979, according to the Census Bureau.

Fancoil units

Domestic shipments of fancoil units in 1981 amounted to 158,000 units, down 9.3% from the revised figure of 175,000 units shipped in 1980. This product tends to follow chiller shipments by about half a year.

Bureau of the Census figures, which include room fancoil units exported as well as domestic shipments, show that 247,406 units were shipped in 1980, up 38% from the 178,719 units shipped the previous year. Vertical units accounted for about two-thirds of the shipments both years.



Induction units

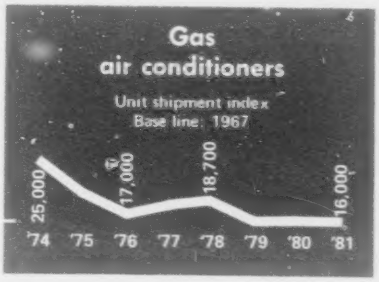
The News had given up reporting this category because room induction units are made by only three companies and the Census Bureau has not reported on them for several years. In 1980, however, the bureau reported that 33,343 room induction units were shipped.

Gas air conditioners

Shipments of gas air conditioners, which became increasingly popular in many areas during the 1960's until natural gas curtailments restricted their market, have continued along a plateau in recent years at about 16,000 units. Last year was no exception.

Water-fired absorption air conditioners used in conjunction with solar-assisted comfort cooling systems, including packages of up to 25 tons, are included in this figure along with exports.

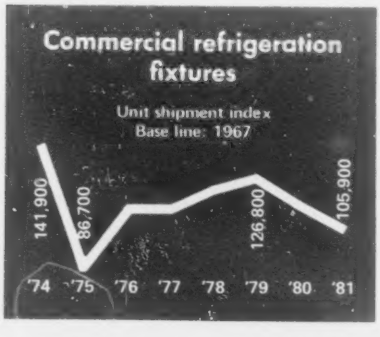
Arkla Industries, Inc., the sole domestic producer of gas- and solar-fired equipment, also are developing a gas-fired absorption heat pump. Double-effect absorption cycles and heat pumps now under development by Arkla and others can be expected to enter the marketplace within three to four years.



Refrigeration

Commercial refrigeration

Unit shipments of commercial refrigeration equipment dropped by 7.9% in 1981 when compared with the previous year's shipments, according to the Commercial Refrigerator Manufacturers Association (CRMA).



Dollar value of this equipment increased by 9.84%, however, the association reported.

Shipments of standard-temperature cases declined by 5.31%. This included a 7.67% drop in reach-ins, a 34.47% drop in walk-ins, and a whopping 508% increase in "other" or specialty cases.

Shipments of low-temperature cases declined by 13.29%. This included a 24.14% drop in single-deck cases, a 13.84% drop in multidecks, but a 5% improvement in shipments of enclosed low-temperature cases.

Although these are the only figures released by CRMA, an industry statistical study published last year by the Air-Conditioning and Refrigeration Institute (ARI) provides an estimate of commercial refrigeration dollar and unit shipment totals The News believes to be more accurate than its own.

If we apply the CRMA multipliers to base ARI figures for 1979, the dollar total for last year would be $305,838,256, up from $278,439,781 in 1980. Similarly, total unit shipments last year would be 105,900, down from 115,000 in 1980. The News has revised its figures accordingly.

The latest Bureau of the Census figures are contained in the 1977 Census of Manufactures. However, these figures are incomplete in order to protect against manufacturer identification.

The report lists that, in 1977, a year in which ARI estimates 114,192 units were shipped, the following units were shipped: standard-temperature reach-ins 74,000 units; low-temperature reach-ins 29,900 units; closed meat cases 11,200 units; open single-level cases 26,000 units; open multilevel 31,700 units; open single-level frozen food cases 32,000 units; multilevel frozen food cases 11,000 units; and closed frozen food cabinets 6,400 units.

The difference between the two sets of figures is obvious. The only rational explanation is that commercial refrigeration equipment for restaurants and hotels is mixed in with that for supermarkets.

Refrigeration service

In an effort to supply readers with more information on the commercial refrigeration market, The News in February surveyed 2,100 contractors, users, and wholesalers to learn more about their involvement with this important market segment.

We received 466 replies for a response rate of 22.2%. This included 24% of the contractors contacted, 21.5% of the users, and 11% of the wholesalers. Of those who responded, 45.8% of contractors, 23.3% of users, and 36.4% of wholesalers reported they were involved with commercial refrigeration.

It was no surprise when 93.6% of contractors said they were involved with service. The surprise came when 59.2% of users said they service their own equipment. On the other side of the ledger, 46.6% of contractors reported they have service contracts with multistore companies, and 24.1% of users said they rely on service contracts.

We asked the users whether the cost of refrigeration, as a percentage of overhead, has been increasing or decreasing. Although 55.1% said refrigeration costs are increasing, 20.4% said they have remained at about the same percentage of overhead — and one out of 10 said refrigeration costs in relation to other overhead items were actually decreasing. Another 14% didn't reply.

When it came to who, in the contractor's or user's particular town, handled the service work for supermarket chains, the answer was essentially the same. They agreed that nearly 40% of service work (36.9% for contractors, 39.4% for users) is being done by supermarket employees and the remaining 60% is handled by contractors.

In a similar vein, more than three out of 10 contractors (35.8%) told us their supermarket business has increased over the past five years. Almost as many (31.5%) reported it has stayed the same over that period, and 16% said their supermarket service business has dropped.

The biggest business increases have come from convenience stores (55.7%) and bars and restaurants (50%). Among users, nearly four out of 10 (38.4%) have increased their involvement with supermarket service over the past five years while only 7.6% reported less involvement.

Energy management

In the case of electronic energy management systems (EMS), it must be said first that nearly six out of 10 contractors (56.4%) and four out of 10 users (40.8%) have no experience with them.

Of those who are involved with EMS, 73.6% of contractors and 64.3% of users said they usually work. Another 7.5% of contractors and 10.7% of users feel they always work, while 17% of contractors and 25% of users feel they work only sometimes. Comments ranged from "excellent" to "only one in 25 is reliable."

There was strong agreement (78.4% of contractors, 80.8% of users), however, that EMS systems are cost effective. "A very good investment," said one. "A must for all stores in the future," said another.

Contractors apply EMS systems to limit electrical demand (31.7%), conserve overall energy use (28.7%), improve refrigeration system performance (7.9%), and report service problems automatically (10.9%). Similarly, users apply EMS systems to limit demand (22.4%), conserve overall energy use (44.9%), get better system performance (20.4%), and report service problems automatically (12.2%).

But not all have worked as planned. Of the 101 contractors and 49 users who replied to the above question, 39 contractors (nearly four out of 10) and 23 users (47%) reported they have removed or disconnected EMS systems for one reason or another.

Contractors reported that 38.5% of them were disconnected because they were detrimental to system components, 30.7% could not be serviced properly, 25.6% were ineffective, and 15.4% were replaced by other systems. Obviously, contractors sometimes listed more than one reason.

Users reported that 39.1% were disconnected only to be replaced by another system, 34.8% could not be serviced properly, 30.4% were ineffective, and 21.7% were detrimental to system components.

Looked at individually, demand limiters were disconnected because they were detrimental to system components (29%), ineffective (21%), couldn't be serviced (18%), or were replaced by another system (5%). Systems designed to conserve overall energy use were disconnected because they were detrimental to system components (31%), couldn't be serviced (23%), were ineffective (17%), or were replaced by another system (17%).

Of the EMS systems designed to produce better system performance, 31% were replaced by another system, 21% were judged ineffective, and 16% couldn't be serviced. Of those designed to report service problems, 29% were replaced by another system, and a like number were disconnected because they were detrimental to system components.

Asked for their overall opinion of EMS systems, the answers were mixed. More than half had good things to say, such as "very valuable" and "a good tool to manage energy consumption." One user qualified his endorsement by explaining "they save electricity but sacrifice product on 95°F days."

Several commented on the cost of EMS systems. "Good for energy saving if you can afford them." One added: "A customer spends a fortune to put in an EMS system and the utility raises its rates to compensate for the lost revenue so he's right back where he started."

And there were negative comments ranging from "you must be careful about how you use them" to "they're just a sales gimmick." Several commented that many EMS manufacturers and salesmen do not understand refrigeration systems. One ventured that EMS systems are "60% effective if managed properly."

Training

The News also asked where the respondent or his employees got their training to work on commercial refrigeration equipment. More than eight out of 10 (88.1% of contractors, 84.8% of users) put on the job experience at the top of the list. Next came vocational schools (63.3% of contractors, 65.2% of users).

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Refrigeration

FROM PRECEDING PAGE

Among contractors, OEM training courses (52.2%), wholesaler training (41.2%), and Refrigeration Service Engineers Society programs (29.3%) were other sources of knowledge. Users ranked them this way: OEM programs 36.9%, RSES 21.7%, and wholesaler programs 15.2%.

Of the RSES members who responded, they reported that 20% of their training came from RSES and 28% came on the job. Other sources included OEM courses 16%, vocational schools 18%, and wholesaler training 13%.

Refrigerators

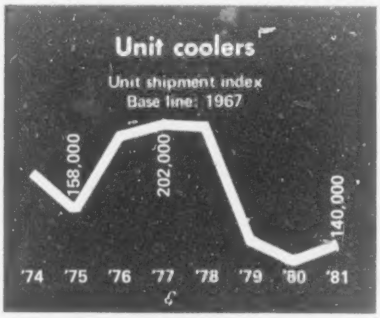
Domestic refrigerator shipments totaled 4,943,800 last year, down 3.5% from the revised figure of 5,123,700 in 1980, according to the Association of Home Appliance Manufacturers (AHAM). The industry association is forecasting an 8% increase in shipments in 1982.

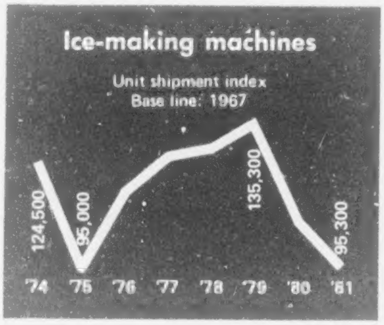
Shipments of home freezers in 1981 amounted to 1,561,000, down 7.2% from the revised figure of 1,681,300 shipped in 1980. The 1981 breakdown shows 44% were upright models and 56% were chest-type home freezers. The outlook for 1982 is for a 6% increase.

Unit coolers

Shipments of unit coolers in 1981 increased by 11% to 140,000 units from a revised 1980 figure of 126,000 units.

It might be noted that the Bureau of the Census reported that 187,434 unit coolers were shipped in 1979 and that 175,371 units were shipped in 1980, the latest year for which figures were available. The difference comes from export units included in the Census Bureau figures along with shipments not reported to industry programs.





Ice makers

Shipments of ice-making equipment increased by 12.6% in 1981 to 107,000 units. This compares to a revised figure of 95,000 units the previous year. Of the 107,000 units shipped last year, approximately 80% were cubers and 20% were flakers.

The Bureau of the Census report shows 216,214 ice-making machines were shipped in 1980, the latest year for which figures are available. This is a 1% drop from the revised figure of 218,827 units shipped in 1979 — and 128% more than The News figures for 1980 ice-maker shipments.

Not only do the government figures include manufacturers who do not participate in industry statistics programs, but ARI has asked the Census Bureau to check possible double reporting.

Refrigerated warehouses

Although the construction of new warehouses was down considerably last year, activity in the existing 796 million ft^3 of public freezer space was brisk, according to the International Association of Refrigerated Warehouses (IARW).

IARW reported that public freezer occupancy averaged 75% during 1981's peak fall season, the same as for 1980 and just below the record of 77% set in 1979. Occupancy traditionally dips to 66% or 67% in the early spring.

Figures recording additions to public freezer space will not be available for a few months but IARW expects 1981 performance will be considerably below the 50 million ft^3 added in 1980 to bring the total amount of public freezer space to 796 million ft^3.

The economic recession usually has an adverse effect on freezer occupancy rates, IARW reports, and the 1981-1982 season is no exception. Although occupancy rates averaged 70% at the end of January, there has been a strong movement of goods out of storage as merchants seek to turn smaller inventories more often.

Heating

Residential boilers

Gas-, oil-, and solid fuel-fired boiler unit shipments dropped by 32.7% in 1981 to 251,022 units from 372,974 boilers in 1980, according to The Hydronics Institute (HI).

Shipments of cast iron boilers dropped 36.4% last year to 221,354 units from a 1980 figure of 374,946. Shipments of steel boilers, which had dropped by 41% to 25,028 units in 1980, bounced back in 1981 by 18.5% to 29,668 units.

Signs that the threat of decontrol of natural gas prices and the relative stability of oil prices had slowed the conversion of oil fuel customers to natural gas were evident in the fuel mix statistics. The ebbing of this three-year phenomenon, together with the sluggish economy, were blamed for the sharp drop in overall boiler shipments.

The gas share of the cast iron boiler market, which had soared to 85% in 1980, settled back to a more-normal 71% in 1981. It had been 50% in 1977 when many gas utilities were not adding residential customers.

Oil's share of the cast iron boiler market in 1981 was 28.4%, up from 15% in 1980. The oil share in 1977

TURN TO PAGE 32

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FROM PAGE 30

Estimated 1981 cast iron boiler shipments by thermal capacity

Gross output, Btu	Steam	Water	Total
Less than 50,000	39	2,428	2,467
50,000 - 74,999	1,062	21,561	22,623
75,000 - 99,999	7,862	34,568	42,430
100,000 - 124,999	15,417	43,782	59,199
125,000 - 149,999	9,067	23,896	32,963
150,000 - 199,999	8,469	18,652	27,121
200,000 - 249,999	5,356	9,652	15,008
250,000 - 449,999	4,744	5,699	10,443
450,000 - 949,999	2,719	1,847	4,566
950,000 - 1,549,999	1,412	815	2,227
1,550,000 and over	1,436	871	2,307
Total	**57,583**	**163,771**	**221,354**

Estimated 1981 cast iron boiler shipments by fuel

Gross output, Btu	Solid Fuel	Gas Fired	Oil Fired	Total
Less than 50,000	0	2,418	49	2,467
50,000 - 74,999	44	22,333	246	22,623
75,000 - 99,999	48	38,605	3,577	42,430
100,000 - 124,999	76	42,036	17,087	59,199
125,000 - 149,999	66	16,336	16,561	32,963
150,000 - 199,999	115	15,155	11,851	27,121
200,000 - 249,999	140	10,396	4,472	15,008
250,000 - 449,999	89	6,333	4,021	10,443
450,000 - 949,999	51	2,269	2,246	4,566
950,000 - 1,549,999	22	1,106	1,099	2,227
1,550,000 and over	28	562	1,717	2,307
Total	**679**	**157,749**	**62,926**	**221,354**

was 49.5%. Boilers fired by solid fuels (coal, wood, or waste) amounted to 0.3% of total shipments in 1981, up slightly from 0.25% the previous year.

The share of cast iron hot water boilers, at 74%, held constant last year, as did cast iron steam boilers, at 26%. The shares in 1980 were 75.3% hot water and 24.7% steam.

Radiation shipments in 1981, according to HI, were: convectors 2,154,615 ft² EDR (equivalent direct radiation), down 0.8% from the 1980 figure of 2,171,878 ft² EDR; baseboard 28,720,337 ft² EDR, down 7.4% from the 1980 figure of 31,029,785 ft² EDR; and commercial finned tube 7,868,320 ft² EDR, down 10.3% from the 1980 figure of 8,768,417 ft² EDR.

Total radiation, at 38,743,272 ft² EDR, was down 7.7% from the 1980 figure of 41,970,080 ft² EDR, which itself represented a 27% drop from previous-year totals.

The reduction in the rate of increase for radiation products is a reflection of the fewer number of conversions together with a strong replacement market, in which radiation already is in place. The overall drop, however, also reflects the depressed housing market, particularly in the northeast and midwest where hydronic heat is the strongest.

Residential furnaces

After a precipitous slide in each of the two previous years, **oil furnace shipments** in 1981 bounced back to 81,200 units, up 28% from the 1980 figure of 63,400 units, according to the Gas Appliance Manufacturers Association (GAMA). Shipments in 1979 amounted to 157,800 units.

In October, 1981, GAMA forecast that oil-fired furnace shipments will drop by 22.5% in 1982 to 62,900 units. We feel a drop of 10% is more like it, particularly because it would appear GAMA members may have overestimated the conversion rate of oil to gas furnaces.

GAMA has advised The News, however, that its figures have not been expanded to include the total industry. The Bureau of the Census reported shipments of 75,162 residential oil furnaces and 4,944 commercial units (of more than 150,000 Btu/h) for a total of 80,106 units in 1980, the latest year for which figures are available. In 1979 the figures were 169,577 residential, 10,690 commercial, for a total of 180,267 units.

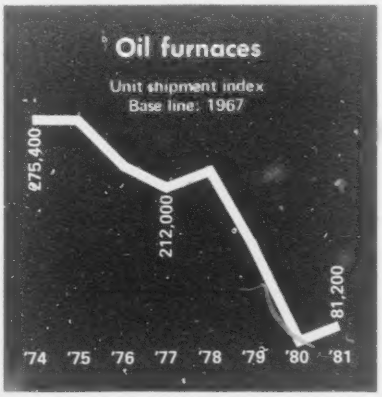
Fuel Oil/Oil Heat and Solar Systems magazine, whose estimates have almost exactly paralleled those of the Census Bureau in recent years, estimates that 1981 shipments of oil furnaces amounted to 110,000 units, an increase of 34% over the 1980 experience.

Gas furnace unit shipments, despite the depressed level of housing starts, showed a drop of only 2% in 1981 to 1,416,700 units. That compares to 1,445,100 units in 1980.

GAMA expects gas furnace shipments to increase by 20% to 1,703,400 units this year. We think that, unless housing starts turn around dramatically, only a 10% increase is possible. A lessening rate of conversions from oil and electricity to gas, we feel, will be more than offset by a steadily growing replacement market that is being driven as much by efficiency increases as by worn out units.

Gas-fired unit heater shipments dropped in 1981 by 19.3% to 142,600 units from a 1980 figure of 176,720 units. This market should hold about even in 1982.

Gas-fired duct furnace shipments decreased by 15% in 1981 to



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RA 4/82

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17,675 units. The 1980 figure was 20,830. Look for a flat year in 1982.

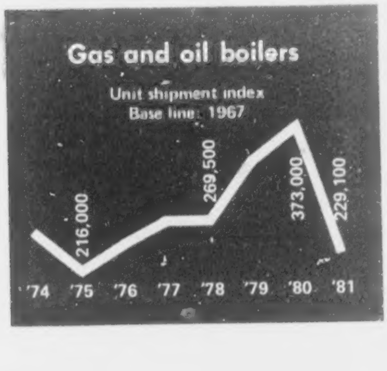
Gas-fired wall furnace shipments dropped 36% in 1981 to 127,160 units. The 1980 figure was 199,820 units. GAMA expects some improvement this year to 149,000 units.

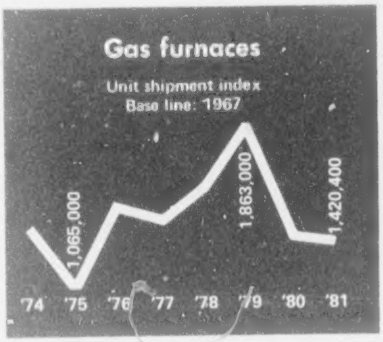
The availability of conversion burners, a severe problem for nearly two years after natural gas was again made generally available, was not a problem in 1981. In fact, some gas utilities already are beginning to tighten up on availability, although the reasons would appear to have as much to do with the high cost of borrowed money to extend and enlarge gas mains as it has to do with gas availability.

Early in 1981, GAMA estimated that the rate of conversions from other fuels to natural gas would be 227,300 in 1981 and that the rate would drop slightly to 218,500 conversions in 1982. Increased gas prices in some of the prime conversion areas, together with public fears they would go higher with decontrol of natural gas prices, are thought to have pushed the actual conversion rate considerably below those projections.

The marketing of residential gas furnaces and boilers has been further complicated by indecision at the federal and state levels over efficiency-related regulations. Several states have required the elimination of standing pilots only to reverse the regulation later while other states do not enforce a standing pilot ban — moves that surely affect the distribution chain.

At the federal level, the U.S. Department of Energy has delayed mandatory efficiency minimums for more than a year and is expected to abandon that approach within a few weeks. Meanwhile, GAMA is initiating a certification program for gas furnaces (HI already has one for boilers), and several manufacturers have introduced new designs which boost seasonal efficiencies well above 80%.





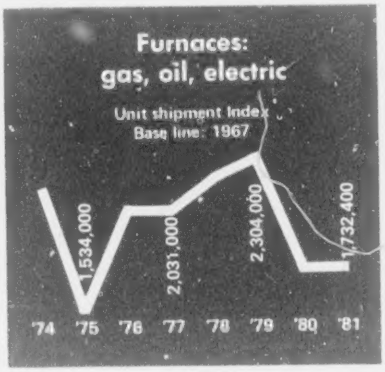
Electric furnace shipments increased by 3.2% to 234,500 units in 1981 despite stiff competition from natural gas and a depressed housing market. Shipments the previous year totaled 227,200 units. The strength, we feel, came from the product's use as a back-up heat source for air-to-air heat pumps, a factor that should keep electric furnaces reasonably strong again this year.

Total **gas, oil and electric furnace shipments** in 1981 amounted to 1,707,300 units, down only 1.6% from the previous-year total of 1,735,700 units. The rebounding of oil-fired units and heat pumps (which provided strength for electric furnaces), together with a strong gas furnace replacement market, explain the strength of overall furnace shipments in the face of a continued downturn in housing starts, the traditional barometer for this product group.

Oil burner installations in 1981 totaled 620,000 units, an increase of 6% from the 585,000 installations in 1980, according to Fuel Oil/Oil Heat and Solar Systems magazine.

Of these, 20,000 oil-fired systems were installed in new single-family homes last year, down 34% from the 30,300 oil-fired systems installed in new homes in 1980. New home installations amounted to 85,000 in 1979.

Part of the reason for oil's poor new construction performance last year was that oil heating's stronghold, the northeast, had only a 10.5% share of the depressed new home market in 1981. Added to this handicap, oil captured only a 1.9% share of the new single- and multi-family home markets last year.



There were 549,000 replacement oil burners shipped in 1981, a 1.7% increase over the 540,000 replacement burners shipped in the previous year. The magazine estimates that close to 80% of these were retention-head and other high efficiency burners which replaced less efficient burners on a voluntary (to save fuel) or involuntary (breakdown) basis.

Conversions to oil from other fuels, at about 11,000 in 1981, showed a 10% improvement over the 10,000 conversions during the previous year. The rate of conversions from oil to natural gas, which was believed to be more than 300,000 in 1980, slowed dramatically last year and probably did not top 200,000.

It was estimated there were 95,000 oil-fired boilers shipped in

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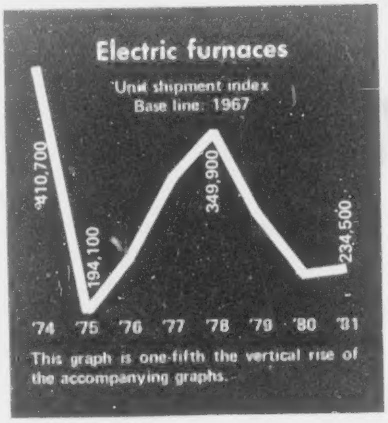


This graph is one-fifth the vertical rise of the accompanying graphs.

FROM PRECEDING PAGE

1981, a 34% increase over the estimated 71,000 oil boilers shipped the previous year. There were 110,000 oil-fired furnaces shipped last year, another 34% increase over the estimated 82,000 oil furnaces shipped in 1980. Oil-fired furnaces and boilers accounted for 425,000 units in 1978.

Shipments of **commercial-industrial boilers** from 10 boiler hp to 1,000 boiler hp declined by 12.3% in 1981 to 6,710 units, according to the American Boiler Manufacturers Association (ABMA). The 1981 figure compares to 7,650 units shipped in 1980.

The decline was more severe for commercial boilers, which dropped 13.8% from 4,700 units in 1980 to 4,050 units last year. Packaged firetube boiler shipments declined by 9.8% from 2,950 units in 1980 to 2,660 units in 1981.

The market has been sliding downward steadily for four years, due in part to energy conservation measures within industrial plants and in part because of the recession-caused excess capacity in many industrial plants that has allowed owners to postpone expansion plans.

Government intervention, which had been a problem in the past, has eased considerably, according to ABMA. An exception would be the influence of government on the money market, which has been a major contributor to high interest rates and the resulting postponement of many expansion projects.

Shipments of burners of 400,000 Byu/h to 25 million Btu/h dropped by 36.2% in 1981 to 18,500 units. The 1980 figures was 29,000 units. Here again the decline was more a reflection of the rapidly slowing pace of conversions from other fuels to natural gas than of any real slowdown in the burner market. The 1979 shipment figure was 19,000 units.

Related products

Sales bookings for industrial air pollution control equipment increased by 38.6% in 1980, the most recent year reported by the Industrial Gas Cleaning Institute (IGCI). The increase in 1979 was 35%.

Total sales in 1980 amounted to $1.092 billion, up from $788.4 million the previous year. The total represents 39 reporting companies, two less than the number reporting 1979 data.

Booking value of electrostatic precipitators, at $164.8 million, was up 2.6% in 1980 from the $106.6 million worth booked in 1979. The value of fabric filters, at $212.5 million, was up 27.3% from the previous year's total of $166.9 million.

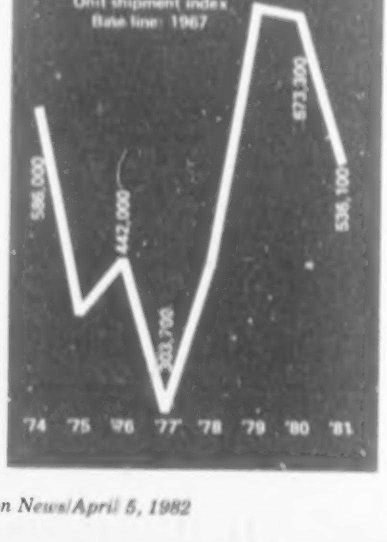
Flue gas desulfurization equipment bookings of $664.4% million were up a dramatic 64.3% over the 1979 booking value of $404.5 million. The level of bookings for this category in 1978 was $159.2 million.

The value of gaseous controls bookings, at $1.8 million in 1980, was down 74% from $6.8 million the previous year and mechanical collector shipment values, at $20.7 million, were up 7.8% from the $19.2 million recorded in 1979. Wet scrubber bookings, at $28.3 million, were down 3.4% in 1980 from the $29.3 million total for the previous year.

The IGCI statistics cover new orders for installations in the U.S. and Canada. All figures include bare flange-to-flange hardware with the exception of flue gas desulfurization equipment, which includes the total contract value.

Power humidifiers

Inflationary pressures on discretionary income and the depressed level of the new home market have combined to push down the power humidifier market. We estimate that shipments dropped by 12% last year to a new low of 387,200 units. The 1980 figure was 440,000.



This product, although primarily an add-on item, often is installed soon after a new or used home is sold to people who, for health or comfort reasons, feel they want the benefits of humidification.

It might be noted that the Bureau of the Census reported that 347,237 humidifiers of all types were shipped in 1980, a year in which The News reported shipments of 440,000 units. The explanation, we feel, is contained in the fact that this was the first year the Census Bureau collected these statistics and all manufacturers did not report.

We feel the power humidifier market has reached its minimum level and should hold steady this year — or even rebound modestly.

Fans

With the exception of power roof ventilators, shipments made by members of the Air Movement and Control Association (AMCA) showed modest increases in 1981 from the previous year.

Centrifugal fan shipments in 1981

TURN TO PAGE 106

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*Government testing procedures were used to determine all annual operating costs.

You'll both profit.

Gas: The future belongs to the efficient.

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40-market survey

Home heating-cooling market promises to be rough in 1982

by Thomas A. Mahoney

A year in which shipments of furnaces, central air conditioners and heat pumps did not decline at the same rate as the new housing market testifies to the strength of the replacement market.

The actual size of that market is in the tens of millions of houses, and the age analysis of home heating systems in the 40 markets in this section attempts to define it a little more closely.

Housing data shown for the 40 markets are taken from the 1978 Annual Housing Survey, as cross-tabulated by the Columbia University Center for the Social Sciences. This analysis is presented in the absence of data from the 1980 Census, which has been delayed and whose ultimate availability is a question mark.

Housing units are defined in two ways: first, by occupancy of single-family or otherwise; and second, by whether the units are occupied by owners or renters.

The two distinctions underline the differences in fuel use and in the types of home heating systems used. Likewise, the saturation of air conditioning varies from city to city, and within each city from owner-occupied and renter-occupied categories.

Phone interviews with hundreds of contractors, distributors and utilities yield a mixed pattern of optimism coupled with a fear that a shrinking market will have to support more and more competitors. With new housing depressed, the service business has to carry more of the load, and that business is subject to ruinous price-cutting.

In today's economic climate, advertising and promotions don't yield the same leads, contractors complain, and referrals from existing customers are the only hard currency. Distributors are running lean on inventories, taking a chance that they won't get short in the (increasingly unlikely) event of a new housing rebound 1982.

The coming year will test the ingenuity and perseverence of an industry that has already undergone more than its share of shocks since the oil embargo eight years ago.

Thomas A. Mahoney

Northeast

Maine
New England
Vt.
N.H.
NORTHEAST
N.Y.
Mass.
Middle Atlantic
Conn.
R.I.
Pa.
N.J.

Housing in the Northeast region represents in large measure an aging inventory of homes, nearly half of which are in the multifamily category, and about 40% of which are renter-occupied units.

Because it represents only about 10% of new housing, equipment shipments to this region will depend largely on the replacement market, which is considerable.

Interviews with distributors and contractors indicate that the big swing from oil to gas here has slowed down, and that there has been some soul-searching as to whether the earlier mass conversion wasn't premature.

Homeowners in the region continue to pay more for energy than those in other parts of the country, a circumstance that may shorten payback periods for replacement systems.

SATURATION PATTERNS

16,952,000 housing units

	Single family 9,486,000	Multi family 7,466,000	Owner occupied 10,155,000	Renter occupied 6,797,000
FUEL USE				
Utility gas	40%	33%	39%	34%
Bottled or LP gas	1%	—	—	—
Fuel oil	60%	58%	51%	57%
Electricity	5%	6%	5%	7%
Other or none	4%	3%	5%	2%
HEATING SYSTEM				
Warm air furnace	46%	30%	43%	22%
Steam or hot water	45%	67%	48%	65%
Built-in electric units	4%	2%	4%	6%
Floor, wall, pipeless furnaces	1%	—	1%	—
Room heaters	2%	1%	2%	5%
Fireplaces, stoves, portable heaters	1%	—	2%	1%
Other or none	1%	—	—	1%
COOLING SYSTEM				
Central	8%	8%	9%	5%
Room unit	36%	35%	38%	31%

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Albany

The Albany area, serving as a magnet for more than 18,000 state government workers, remains a market largely immune from the ups and downs of other single-industry cities.

However, things have flattened out here, according to Roland J. Down, one of Albany's top dealers.

"I don't see anything that would lead me to expect an improvement in the next six months," is his gloomy assessment.

"Things are very, very slow right now (March, 1982). We are keeping 12 guys busy on service calls, but it's impossible to forecast sales or even to budget for our fiscal year, which begins April 1."

One key indicator – a negative one – is that he is not getting the leads he normally gets from his advertising. "The big brains in Washington don't even seem to know what's wrong. I just know that this is going to be one of our toughest years."

Joe Ricciardi, another contractor, sees a pattern repeating itself: in down years, his service business goes up, as it has done in the five "troughs" since 1968. "Service business is solid," he says, but there has been a lot of gloomy economic news that tends to depress buyers, and makes them defer purchases.

Albany-area homeowners, like those in other northern areas, dial down religiously, according to a report by Niagara Mohawk. Fewer than 8% of homeowners keep the thermostat at 70°F or higher at night; the great majority (over 60%) keep it at between 64°F and 69°F.

Age of heating system, single-family, owner occupied

150,400 units

Years old	% of total
0 to 3	12%
4 to 10	28%
11 to 20	26%
21 to 40	25%
41-plus	5%
No response	4%

Average shipments to area

Furnaces	3,000
Heat pumps	500
Central air conditioners	1,500
Humidifiers	1,500
Boilers	2,000

SATURATION PATTERNS

258,000 housing units

	Single family 154,000	Multi family 104,000	Owner occupied 180,000	Renter occupied 78,000
FUEL USE				
Utility gas	47%	49%	49%	44%
Bottled or LP gas	2%	—	1%	2%
Fuel oil	43%	38%	43%	42%
Electricity	3%	9%	3%	12%
Other or none	5%	4%	4%	—
HEATING SYSTEM				
Warm air furnace	45%	30%	42%	35%
Steam or hot water	51%	47%	54%	40%
Built-in electric units	1%	9%	2%	12%
Floor, wall, pipeless furnaces	—	—	—	—
Room heaters	—	9%	1%	13%
Fireplaces, stoves, portable heaters	1%	2%	1%	—
Other or none	2%	3%	—	—
COOLING SYSTEM				
Central	5%	5%	4%	5%
Room unit	40%	21%	40%	15%

Boston

Boston represents much of the problems of the northeastern region of the country: an aging housing stock, punishing fuel costs, and a large renter occupancy of housing units.

More than most cities Boston has had a strong impetus to button up its houses and apartments. At year's end it had conducted more than 55,000 home energy audits under its "Mass-Save" program. Weatherization done on homes is expected to save 13.9 million gallons of heating oil, valued at about $17.6 million.

Fuel costs are crucial here, and deregulation of natural gas is strongly urged by the fuel oil industry. The New England Fuel Institute, an association of more than 1,000 independent retail and wholesale home heating oil suppliers, claims that it employs about 8,000 service technicians and more than 2,000 salesmen.

The Institute claims that 71% of New England's homes are heated with oil, which is now deregulated, and at a competitive disadvantage with natural gas.

Conversions from oil to gas have fallen off sharply after a flurry of activity that reached its height in 1979-1980, when 30,000 homes made the switch to gas.

Age of heating system, single-family, owner occupied

425,200 units

Years old	% of total
0 to 3	10%
4 to 10	16%
11 to 20	33%
21 to 40	28%
41-plus	6%
No response	7%

Average shipments to area

Furnaces	9,000
Heat pumps	1,500
Central air conditioners	5,000
Humidifiers	5,000
Boilers	10,000
Vent dampers	4,000

SATURATION PATTERNS

940,000 housing units

	Single family 460,000	Multi family 480,000	Owner occupied 498,000	Renter occupied 442,000
FUEL USE				
Utility gas	33%	34%	32%	31%
Bottled or LP gas	2%	—	—	1%
Fuel oil	62%	63%	64%	61%
Electricity	2%	4%	3%	5%
Other or none	1%	2%	1%	2%
HEATING SYSTEM				
Warm air furnace	35%	17%	31%	18%
Steam or hot water	60%	74%	66%	72%
Built-in electric units	2%	3%	2%	5%
Floor, wall, pipeless furnaces	—	—	—	—
Room heaters	—	3%	—	—
Fireplaces, stoves, portable heaters	—	2%	—	2%
Other or none	3%	1%	1%	3%
COOLING SYSTEM				
Central	7%	3%	4%	4%
Room unit	38%	32%	43%	36%

Buffalo

The pulse of new housing construction beats faintly here, following three successive years in which new housing construction declined. Fewer than 1,500 units were built last year.

Replacement sales have to carry distributors and contractors here, and dealers report a stiffening of resistance to any but the most economical heating system they can buy.

A long-standing energy audit program has stimulated some business here, but contractors remain skeptical about its effect on business.

Still, says Dick Noel, a heating dealer, some people would have delayed a replacement furnace if they hadn't been alerted to a low-interest loan program that's part of the New York State Residential Conservation Service (RCS) program.

"Homewowners get wind of the low interest loans. They say to themselves, 'Why don't I take advantage of the loan?'

"But I tend to shy away from bidding jobs under RCS. I feel I'm slitting my own throat. The homeowner has to get three bids, and a lot of times I know when I quote a job the customer has already got his mind made up; but the utility has told him to get three bids, so I'm just along for the ride."

Besides, he adds, most of the people who get audits are the ones who have already weatherproofed their homes, but the audit is virtually free, so they take advantage of it.

Age of heating system, single-family, owner occupied

232,000 units

Years old	% of total
0 to 3	14%
4 to 10	15%
11 to 20	36%
21 to 40	27%
41-plus	1%
No response	7%

Average shipments to area

Furnaces	6,000
Heat pumps	1,000
Central air conditioners	4,000
Humidifiers	4,000
Boilers	2,000
Vent dampers	3,000

SATURATION PATTERNS

592,000 housing units

	Single family 386,000	Multi family 206,000	Owner occupied 337,000	Renter occupied 225,000
FUEL USE				
Utility gas	81%	88%	84%	88%
Bottled or LP gas	—	—	—	—
Fuel oil	14%	4%	12%	3%
Electricity	4%	7%	3%	7%
Other or none	1%	1%	1%	2%
HEATING SYSTEM				
Warm air furnace	76%	55%	77%	25%
Steam or hot water	14%	26%	14%	58%
Built-in electric units	2%	6%	1%	5%
Floor, wall, pipeless furnaces	1%	5%	1%	3%
Room heaters	4%	5%	4%	7%
Fireplaces, stoves, portable heaters	1%	1%	2%	—
Other or none	2%	2%	1%	2%
COOLING SYSTEM				
Central	4%	4%	3%	4%
Room unit	24%	18%	20%	16%

Newark

Fuel oil sales in the Newark area are down by as much as 15% for some dealers, a decline caused by conversions to gas (although this has slowed down greatly) and by increased conservation measures taken by homeowners.

Increased efficiency in burners has also cut into the total oil consumption, according to Tom McCreesh, of Dunphey-Smith, an equipment distributor.

A few oil dealers have taken the stance of "if you can't fight them, join them," by replacing oil systems with gas furnaces.

"Rather than lose the business completely, the oil dealer will do the gas furnace installation and keep the service contract," McCreesh says.

Nevertheless, forced air furnaces remain in the minority here, representing only about one quarter of the market. Hydronic heat is the traditional means of heating homes.

Fuel oil retains a better than 50% share of the market, and the recent easing of oil prices will dampen any enthusiasm for continued fuel switching.

Central air conditioning in single family homes is still a minority item. Like other cities with a large inventory of hydronically heated homes, Newark's main mode of cooling is window units, which are found in nearly half of its single family homes.

Age of heating system, single-family, owner occupied

291,600 units

Years old	% of total
0 to 3	11%
4 to 10	14%
11 to 20	29%
21 to 40	33%
41-plus	3%
No response	10%

Average shipments to area

Furnaces	**5,000**
Heat pumps	**1,000**
Central air conditioners	**4,000**
Humidifiers	**2,000**
Boilers	**10,000**
Vent dampers	**3,000**

SATURATION PATTERNS

578,000 housing units

	Single family 306,000	Multi family 272,000	Owner occupied 323,000	Renter occupied 255,000
FUEL USE				
Utility gas	45%	24%	44%	25%
Bottled or LP gas	1%	—	—	—
Fuel oil	53%	72%	55%	72%
Electricity	1%	4%	1%	3%
Other or none	—	—	—	—
HEATING SYSTEM				
Warm air furnace	30%	6%	27%	8%
Steam or hot water	69%	85%	72%	83%
Built-in electric units	1%	3%	—	3%
Floor, wall, pipeless furnaces	—	1%	—	1%
Room heaters	—	3%	—	3%
Fireplaces, stoves, portable heaters	—	2%	—	1%
Other or none	—	—	—	—
COOLING SYSTEM				
Central	14%	4%	13%	3%
Room unit	48%	42%	46%	40%

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New York City

On Long Island, contractor Danny Ramirez reports the aggressive promotion of oil as a home heating fuel has started to blunt the conversion craze from oil to gas.

"Generally, the conversion and replacement business is down here. People are holding back, and quite a few of them are convinced that the energy crisis is over, and they're waiting for fuel prices to fall," he says.

From three conversions a week during the 1979-1980 heating season, his conversion volume has now tapered off to about half that. However, with new installations, gas now has a ratio of about five-to-one over oil.

In neighboring Queens, Stanley Zipp of Hartack Corp., echoes the same theme: "Conversions? Forget about them. The oil promotion has gotten people so confused they don't know what fuel to use, so they're doing nothing."

Even the service business has fallen off drastically, he says. "We aren't even getting night emergency service calls. Maybe we've been doing too good a job in the past, and the institutions and apartment buildings just don't need our services this year."

The New York metropolitan area continues to pay among the highest prices for home heating fuel, according to the city's Energy Office. "Rising energy costs are threatening the economic viability of the city and the quality of life of its residents," it has warned.

Age of heating system, single-family, owner occupied

1,040,000 units

Years old	% of total
0 to 3	8%
4 to 10	13%
11 to 20	29%
21 to 40	38%
41-plus	6%
No response	6%

Average shipments to area

Furnaces	5,000
Heat pumps	2,000
Central air conditioners	18,000
Humidifiers	3,000
Boilers	20,000
Vent dampers	5,000

SATURATION PATTERNS

3,842,000 housing units

	Single family 1,120,000	Multi family 2,722,000	Owner occupied 1,460,000	Renter occupied 2,382,000
FUEL USE				
Utility gas	34%	22%	33%	21%
Bottled or LP gas	1%	—	—	—
Fuel oil	63%	76%	64%	76%
Electricity	2%	2%	2%	2%
Other or none	—	—	—	—
HEATING SYSTEM				
Warm air furnace	21%	6%	16%	5%
Steam or hot water	76%	92%	80%	92%
Built-in electric units	1%	1%	2%	1%
Floor, wall, pipeless furnaces	1%	1%	1%	—
Room heaters	—	—	1%	1%
Fireplaces, stoves, portable heaters	1%	—	—	—
Other or none	—	—	—	1%
COOLING SYSTEM				
Central	9%	5%	10%	4%
Room unit	53%	45%	56%	34%

Philadelphia

A third of all unitary equipment shipped into Pennsylvania is heat pumps, and about half of all unitary equipment shipped into Philadelphia is heat pumps.

Philadelphia absorbs a lot of heat pumps in its new construction; about 70% of all new housing has them. In 1980 alone, new homes absorbed about 6,000 units.

Electric utility officials report that the add-on heat pump program, which began in 1979 with 400 installations and jumped to 1,400 units in 1980, flattened out at that level last year.

They blame the warm spring of 1981, which tempted a lot of contractors to go for a high volume of lower-cost straight cooling replacements, which went in at the expense of add-on heat pumps.

The residential air conditioning replacement market for any given year is about 10,000 to 12,000 units, they believe, and as gas prices escalate the add-on pumps will continue to displace straight cooling.

How does 1982 look? "Lousy," says contractor Bill Sherwood, who does a big residential-light commercial business. "The suburban market looks okay, but we've seen a drop-off in business within the city limits."

Age of heating system, single-family, owner occupied

1,060,000 units

Years old	% of total
0 to 3	11%
4 to 10	17%
11 to 20	28%
21 to 40	30%
41-plus	3%
No response	11%

Average shipments to area

Furnaces	**15,000**
Heat pumps	**10,000**
Central air conditioners	**25,000**
Humidifiers	**15,000**
Boilers	**10,000**
Vent dampers	**9,000**

SATURATION PATTERNS

1,627,000 housing units

	Single family 1,178,000	Multi family 449,000	Owner occupied 1,025,000	Renter occupied 602,000
FUEL USE				
Utility gas	52%	40%	51%	44%
Bottled or LP gas	—	—	—	—
Fuel oil	44%	52%	44%	51%
Electricity	4%	8%	4%	5%
Other or none	—	—	1%	—
HEATING SYSTEM				
Warm air furnace	56%	40%	54%	46%
Steam or hot water	41%	54%	43%	50%
Built-in electric units	2%	5%	2%	3%
Floor, wall, pipeless furnaces	—	—	—	—
Room heaters	—	—	—	—
Fireplaces, stoves, portable heaters	1%	1%	1%	1%
Other or none	—	—	—	—
COOLING SYSTEM				
Central	18%	20%	20%	17%
Room unit	49%	45%	51%	42%

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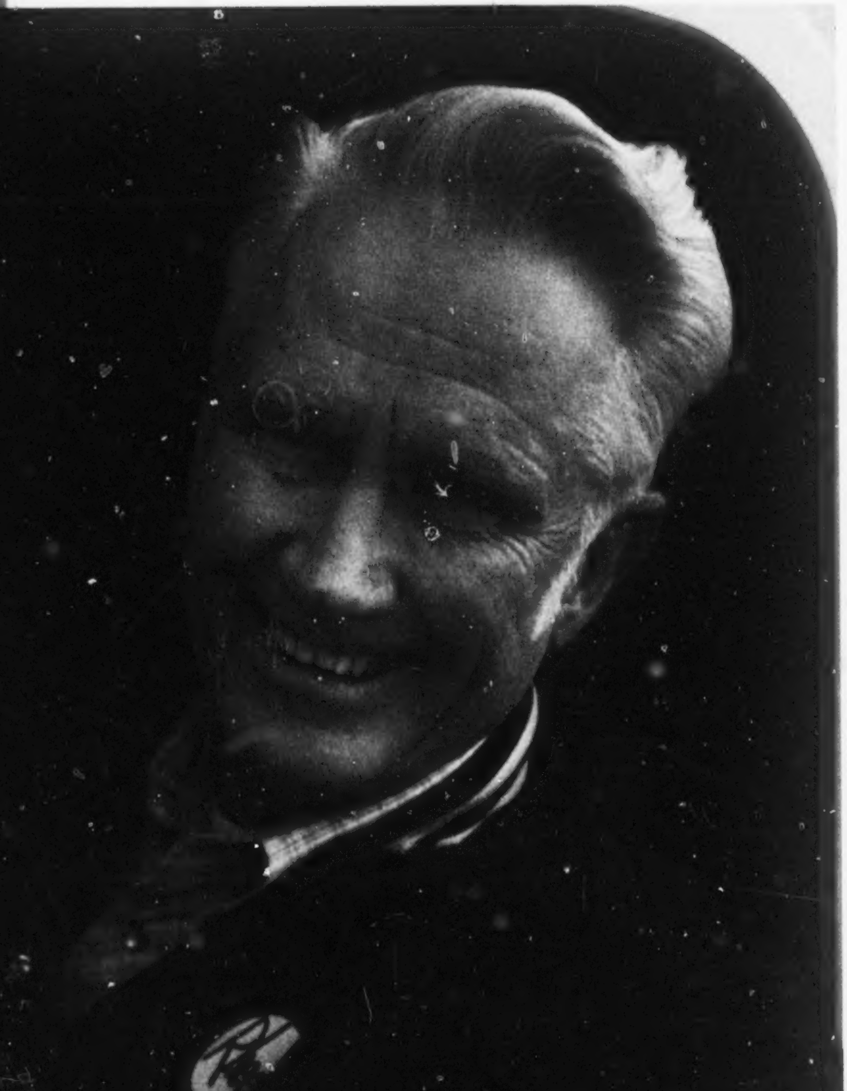

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Pittsburgh

The Pittsburgh market, with one of the lowest housing growth patterns in the past decade, still offers a considerable replacement market for heating systems.

One successful dealer, Equitable Heating Co., relies on a steady stream of referrals, trading on a venerable company name in Pittsburgh.

"When its cold, people call us; when it's hot, people call us. It's the in-between times that you really have to promote," says Ed Leete of Equitable. A recent home show generated 18 prospects for new furnaces, he says.

Gas, selling for about 40 cents a therm, and expected to rise by at least 50% in the next three years, has made high efficiency furnaces (85% efficiency range) fairly easy for Equitable to sell.

John Bruggeman, of Eckstein Co., an equipment distributor, says marketers now confront a new housing market in which "the bloom is off the rose." Many of the new homes built in the outer suburbs had heat pumps, but as gas availability has grown, the pumps have declined.

Replacement furnace efficiencies have risen gradually, and new house systems now average about 75% efficient, according to Equitable Gas Co., one of two gas utilities serving Pittsburgh.

Age of heating system, single-family, owner occupied

528,000 units

Years old	% of total
0 to 3	14%
4 to 10	16%
11 to 20	35%
21 to 40	28%
41-plus	1%
No response	6%

Average shipments to area

Furnaces	14,000
Heat pumps	3,000
Central air conditioners	10,000
Humidifiers	5,000
Boilers	5,000
Vent dampers	4,000

SATURATION PATTERNS

838,000 housing units

	Single family 628,000	Multi family 210,000	Owner occupied 527,000	Renter occupied 311,000
FUEL USE				
Utility gas	83%	80%	82%	81%
Bottled or LP gas	1%	—	1%	—
Fuel oil	12%	2%	13%	4%
Electricity	2%	18%	2%	12%
Other or none	2%	—	2%	3%
HEATING SYSTEM				
Warm air furnace	83%	47%	83%	57%
Steam or hot water	12%	38%	15%	27%
Built-in electric units	—	13%	—	9%
Floor, wall, pipeless furnaces	2%	—	1%	—
Room heaters	1%	2%	—	—
Fireplaces, stoves, portable heaters	1%	—	—	7%
Other or none	1%	—	1%	—
COOLING SYSTEM				
Central	11%	13%	12%	10%
Room unit	25%	24%	25%	27%

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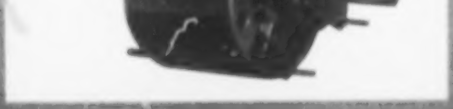

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Providence

Providence is a fuel oil-heavy market, although both natural gas and electricity have increased their market share here.

Joe Roscoli of the New England Electric System believes that Providence was about one year ahead of the rest of the nation in getting into the home energy audit program. "People have taken the audits seriously, and we've seen the results in our own load pattern," he says.

Also new to the market is an infusion of "thousands and thousands" of 1 kW quartz heaters.

"But their use is so diverse that it hasn't shown up as a bulge in our load profile. We think maybe people are shutting off their water heaters and the load from the quartz heaters is just a trade-off."

Although the utility is not promoting electric heat, it has noted an increase in the number of add-on heat pumps, primarily in condominiums, as well as in light commercial applications.

About 80% of conversions to gas have been from oil, and American Gas Assn. estimates for 1980, the last year monitored, place conversions to gas at around 4,000 for the entire state.

Age of heating system, single-family, owner occupied

183,000 units

Years old	% of total
0 to 3	15%
4 to 10	13%
11 to 20	32%
21 to 40	29%
41-plus	4%
No response	7%

Average shipments to area

Furnaces	3,000
Heat pumps	700
Central air conditioners	1,000
Humidifiers	1,500
Boilers	3,500

SATURATION PATTERNS

381,000 housing units

	Single family 207,000	Multi family 174,000	Owner occupied 194,000	Renter occupied 187,000
FUEL USE				
Utility gas	19%	50%	25%	45%
Bottled or LP gas	2%	—	2%	1%
Fuel oil	71%	44%	67%	48%
Electricity	6%	6%	5%	6%
Other or none	2%	—	1%	—
HEATING SYSTEM				
Warm air furnace	26%	12%	27%	10%
Steam or hot water	65%	63%	66%	65%
Built-in electric units	4%	5%	4%	5%
Floor, wall, pipeless furnaces	1%	—	1%	—
Room heaters	1%	15%	1%	14%
Fireplaces, stoves, portable heaters	1%	2%	—	—
Other or none	2%	3%	1%	6%
COOLING SYSTEM				
Central	4%	4%	3%	4%
Room unit	23%	30%	34%	30%

Rochester

Recent cutbacks by General Motors and Xerox here have been partially offset by the expansion of Kodak, with the net effect that Rochester has been spared a precipitous loss of jobs.

"The economic downturn didn't hit Rochester until late last year," says Alan Figler of North Star Supply Co. "Then it dipped. We hit February like it was a brick wall."

Furnace efficiencies? "We saw a great trend to energy conservation and higher efficiencies in furnaces and boilers three years ago, but recently the subject seems to have quieted down," Figler says. "Some homeowners would settle for box of matches and a fan, just to get the lower price."

The switch from oil to gas as a home heating fuel has tapered off here, from a high water mark of 4,000 conversions in both 1979 and 1980 to under 1,800 last year. Nevertheless, 9000 homes in a market of 160,000 is a sizeable chunk of new business.

Heat pumps have not made much of a dent, according to the Rochester Gas & Electric Co., since the utility provides both gas and electric service, and is prohibited from promoting either fuel. Its marketing department thinks the savings from an electric heat pump as an add-on system would be negligible against straight gas heat.

Age of heating system, single-family, owner occupied

190,000 units

Years old	% of total
0 to 3	9%
4 to 10	25%
11 to 20	35%
21 to 40	21%
41-plus	—
No response	10%

Average shipments to area

Furnaces	5,000
Heat pumps	500
Central air conditioners	2,000
Humidifiers	2,000
Boilers	1,500

SATURATION PATTERNS

304,000 housing units

	Single family 205,000	Multi family 99,000	Owner occupied 185,000	Renter occupied 119,000
FUEL USE				
Utility gas	59%	60%	60%	59%
Bottled or LP gas	3%	—	2%	1%
Fuel oil	33%	34%	33%	35%
Electricity	4%	5%	3%	4%
Other or none	1%	1%	2%	1%
HEATING SYSTEM				
Warm air furnace	90%	67%	90%	71%
Steam or hot water	4%	25%	5%	21%
Built-in electric units	1%	3%	2%	3%
Floor, wall, pipeless furnaces	—	—	1%	—
Room heaters	2%	4%	—	5%
Fireplaces, stoves, portable heaters	1%	1%	1%	—
Other or none	--	—	—	—
COOLING SYSTEM				
Central	5%	5%	6%	4%
Room unit	29%	28%	30%	25%

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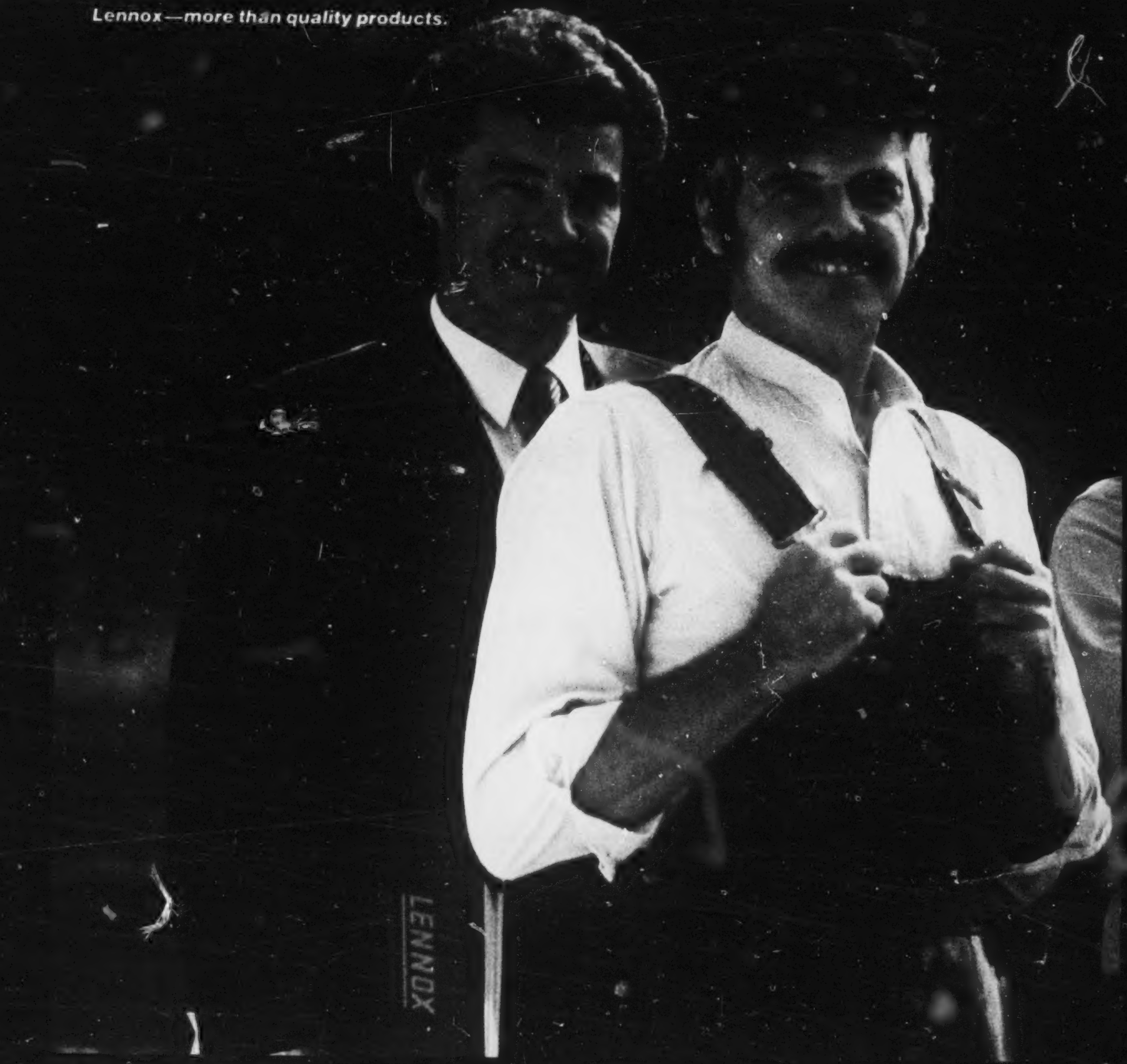

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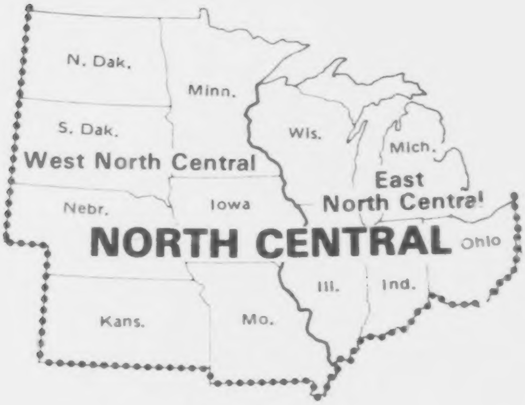
North Central



The North Central region offers a lucrative market for the add-on heat pump, which is being promoted in its heating mode for the spring and fall heating periods.

In cities like Detroit, Chicago and St. Louis, heat pump manufacturers believe the price of natural gas will continue to rise, even in the absence of a formal deregulation of this fuel, and this will make the pumps an attractive profit-builder for contractors.

Census data show hundreds of thousands of oil-heated homes to which gas mains have not been connected; these, too, are logical candidates for add-on heat pumps.

This region is also targeted by manufacturers of high-efficiency forced air furnaces, who see a replacement market of up to 11 million existing furnaces now in place.

SATURATION PATTERNS

20,171,000 housing units

	Single family 14,444,000	Multi family 5,727,000	Owner occupied 14,152,000	Renter occupied 6,019,000
FUEL USE				
Utility gas	69%	67%	69%	71%
Bottled or LP gas	7%	3%	7%	5%
Fuel oil	15%	12%	8%	7%
Electricity	7%	10%	7%	10%
Other or none	2%	8%	9%	7%
HEATING SYSTEM				
Warm air furnace	78%	79%	78%	52%
Steam or hot water	8%	11%	9%	28%
Built-in electric units	4%	3%	4%	7%
Floor, wall, pipeless furnaces	3%	4%	2%	4%
Room heaters	6%	3%	4%	8%
Fireplaces, stoves, portable heaters	—	—	1%	1%
Other or none	1%	—	2%	—
COOLING SYSTEM				
Central	27%	19%	28%	15%
Room unit	30%	35%	31%	37%

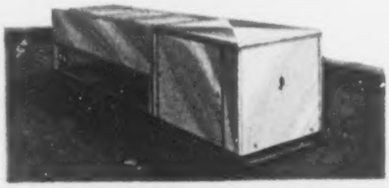
Preserve freshness, firmness and flavor and cut energy costs up to 25% with a dependable Bohnmizer® Refrigeration System

A refrigeration system that loses its cool can generate a lot of heat in high places. That's why refrigeration engineers and warehouse operators alike demand dependable, energy-saving Bohnmizer Systems to retain "garden goodness" and "farm freshness" in produce, dairy products, meats, grains, beverages and more.

Used in conjunction with Bohn Model FM unit coolers which are designed to maintain 35°F temperatures, the patented Bohnmizer System is based on a unique Bohnmizer Flow Control Valve which provides energy savings up to 25% by precisely controlling the flow of refrigerant at high and low pressure differentials, regardless of outdoor temperatures.

Housed in a ruggedly built Bohn Model MB air cooled condensing unit, the Bohnmizer System is completely factory-engineered and assembled, designed for immediate start-up and years of trouble-free service with minimum maintenance.

Keep freshness and profits at their peak with a time-tested Bohnmizer Refrigeration System. For complete information, call your Bohn representative today.



Dependable Bohn Refrigeration...when you can't afford to lose your cool.

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Chicago

Chicago's populous suburbs are just now coming into their own for the residential replacement market, according to Mike Bishop, of Guardian Heating & Cooling, a contracting firm.

"We find a lot of the northern suburbs like Mt. Prospect, Schaumburg, and Rolling Meadows have homes whose furnaces are up to 20 years old, out of warranty, and ready for a new heating system," he says.

Regarding fuel use, Mike sees a gradual conversion from the remaining oil accounts he has – about 600 homes – to gas, "but some of my customers will never convert."

The age of the homeowner is also a factor. "Some of my older customers don't want to make the big outlay for an expensive new high-efficiency system. They tell me, 'I'm not going to be here much longer. Just give me the cheaper furnace.' "

Plentiful and relatively cheap gas continues to restrain heat pump penetration here. Commonwealth Edison estimates it added fewer than 2,000 heat pumps to its lines, and that about 12% of its 9,400 electric heating installations last year were heat pumps.

New home construction in Chicago continues to plummet; 1981 ended with only 9,650 permits, down 26% from 1980, according to Bell Federal Savings and Loan Assn.

Age of heating system, single-family, owner occupied

1,103,000 units

Years old	% of total
0 to 3	14%
4 to 10	27%
11 to 20	31%
21 to 40	19%
41-plus	1%
No response	8%

Average shipments to area

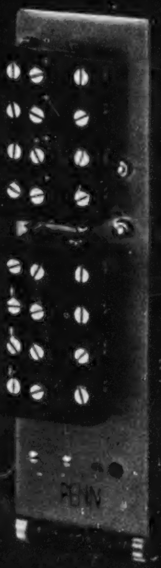
Furnaces	**65,000**
Heat pumps	**4,000**
Central air conditioners	**60,000**
Humidifiers	**80,000**
Boilers	**4,000**
Vent dampers	**50,000**

SATURATION PATTERNS

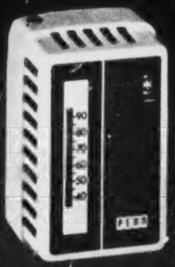
2,439,000 housing units

	Single family 1,172,000	Multi family 1,267,000	Owner occupied 1,341,000	Renter occupied 1,098,000
FUEL USE				
Utility gas	93%	79%	89%	82%
Bottled or LP gas	—	—	—	—
Fuel oil	6%	12%	7%	12%
Electricity	1%	8%	4%	6%
Other or none	—	1%	—	—
HEATING SYSTEM				
Warm air furnace	83%	88%	72%	25%
Steam or hot water	14%	8%	21%	58%
Built-in electric units	1%	1%	3%	5%
Floor, wall, pipeless furnaces	1%	1%	—	3%
Room heaters	1%	2%	3%	3%
Fireplaces, stoves, portable heaters	—	—	—	9%
Other or none	—	—	1%	—
COOLING SYSTEM				
Central	49%	12%	43%	10%
Room unit	29%	43%	32%	43%

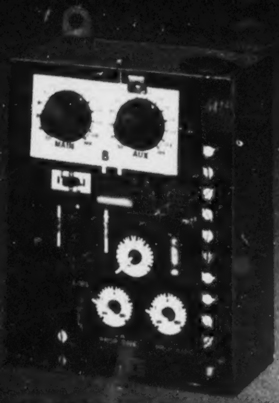
Five more ways Johnson Controls makes your day a little nicer.



The R23 HVAC ACTROL Sequencer. When you carry just one sequencer, you can handle up to 8 stages of capacity control. Thats nice.



The T41 Room Temperature Sensor. When you use this sensor with optional faceplates and sub-base, you get the versatility to cover many varied job specs. And that's nice.



The R94 Reset Temperature Controller. When you add this unit to either the M80J actuator or the R23 sequencer, you control ranges from −40° to 250°F. That's nice too.

The M80J Motor Actuator. When your actuator accepts electronic and potentiometer controllers, has adjustable travel, is a common actuator for master-slave installations, you get complete versatility. That's very nice.

The R82 DC-to-DC Interface. When you combine this with the M80J or R23, you have the capability to interface with a vast range of VDC and maDC controllers. And that's so nice.

You get more than just a product when you depend on controls from Johnson. You get the most advanced engineering that new technology can produce.

Which means you get the latest breakthroughs in energy conservation. You get durable construction. You get easy installation. And you get the kind of versatility that saves time and shrinks inventories.

And most importantly, you get a company that's committed to doing its very best for you and your customer.

"That's nice, Johnson!"

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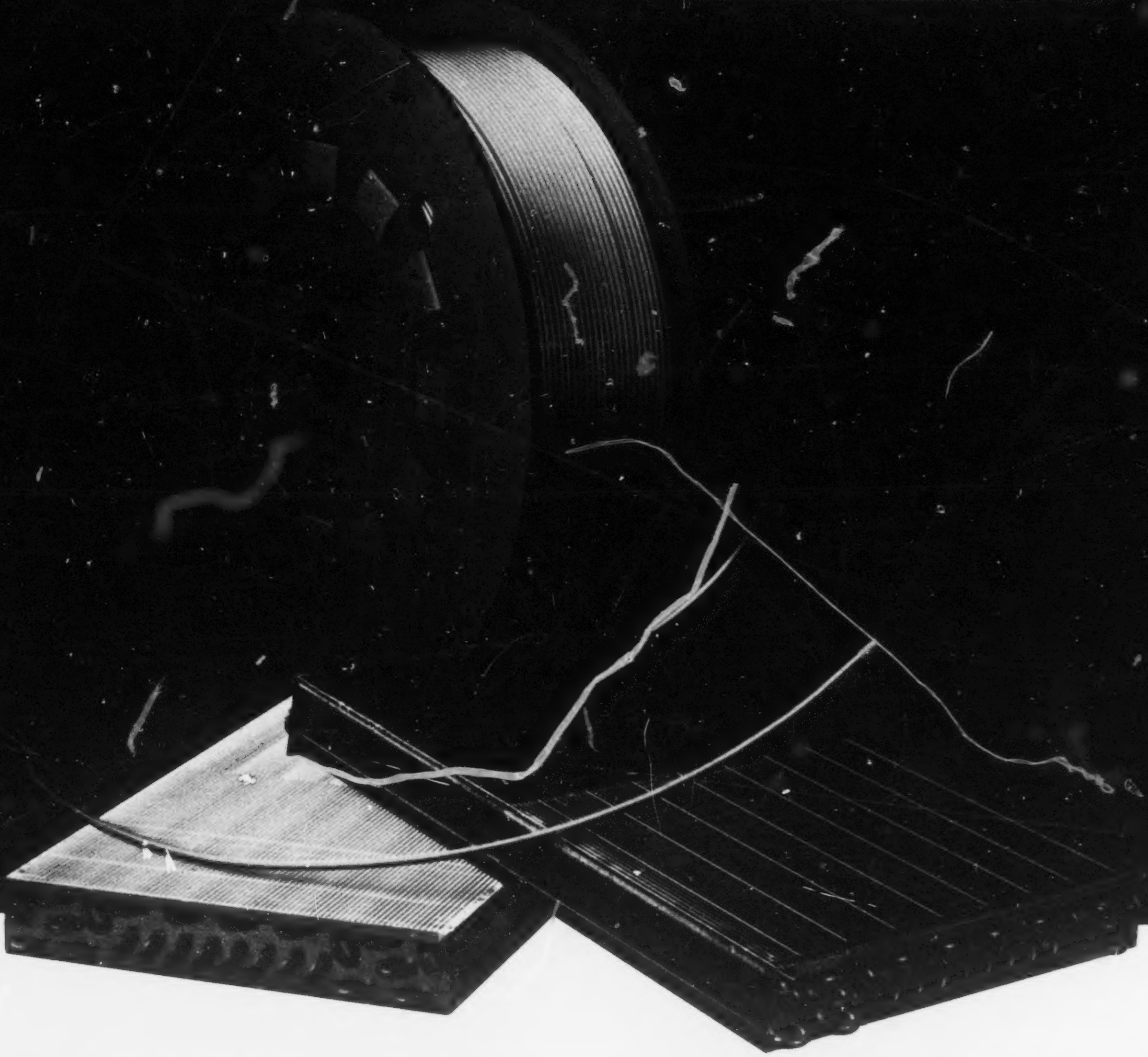

MORE TUBE PER POUND. . . UNITUBE, manufactured by ANACONDA American Brass for the air conditioning and refrigeration industry, can yield up to 6% more tube per pound than Seamless Copper Tubing. That means you can realize up to two more typical condensers or evaporators per reel of UNITUBE.

HIGH TECHNOLOGY. . . UNITUBE is made from close tolerance copper strip, welded, further processed and level wound; retaining the tight tolerance of the original strip.

UNIFORM QUALITY. . . UNITUBE, when compared to a seamless product, has superior concentricity and minimal variation in wall thickness. This allows you to use tubing with a closely controlled average wall to meet your specifications.

TOTAL COMMITMENT. . . Since 1971 our Franklin, Kentucky operation has been totally committed to the production of high quality air conditioning and refrigeration tube. Today, our capital expansion program assures our present and future customers, both domestic and abroad, an adequate supply of uniform, high technology UNITUBE.

For further information or technical assistance contact ANACONDA American Brass, Dept. S. P., Two Continental Towers, 1701 Golf Road, Rolling Meadows, IL 60008.

ANACONDA American Brass

ANACONDA Industries, Division of Atlantic Richfield Company

Cincinnati

Here's what it's like for one Cincinnati contractor, Joe Beres:

"Business has been off anywhere from 40% to 50% for the past two months, and I don't know what it's going to be like next month."

Typical of other midwestern-area contractors, he sees heat pumps representing about 20% of his volume, and about 5% of his customers have switched from oil to gas in the past few years.

Any help from utility ads? "Not much," he says, a sentiment echoed by contractor Tom Bick of Jansen Heating & Air Conditioning, who says, "I won't say the utilities haven't advertised; over a year's time there may have been an ad or some reference to heat pumps, but nothing you could really talk about."

Even the exuberant Doc Rusk has had to cut back, laying off some employees and trimming some fringe benefits. "We have had the worst depression for sales calls for ten salesmen in our history since 1946," he says.

All contractors here are going after the market's aging home furnace market, selling up on service calls to homes with furnaces 15 years old or more.

Efficiencies are a mixed bag. "If you've got somebody who thinks he's going to move in a few years, he won't go the high-efficiency route," says Bick. "If you've got somebody who's going to be there for a while, he'll listen to the high-efficiency story."

Age of heating system, single-family, owner occupied

343,700 units

Years old	% of total
0 to 3	19%
4 to 10	27%
11 to 20	30%
21 to 40	15%
41-plus	1%
No response	7%

Average shipments to area

Furnaces	6,000
Heat pumps	7,000
Central air conditioners	10,000
Humidifiers	10,000
Boilers	1,000
Vent dampers	7,000

SATURATION PATTERNS

524,000 housing units

	Single family 364,000	Multi family 160,000	Owner occupied 345,000	Renter occupied 179,000
FUEL USE				
Utility gas	65%	75%	66%	77%
Bottled or LP gas	3%	—	2%	1%
Fuel oil	21%	10%	20%	12%
Electricity	11%	12%	10%	10%
Other or none	—	3%	2%	—
HEATING SYSTEM				
Warm air furnace	86%	59%	90%	56%
Steam or hot water	3%	27%	3%	30%
Built-in electric units	3%	6%	—	5%
Floor, wall, pipeless furnaces	3%	1%	3%	2%
Room heaters	1%	7%	3%	7%
Fireplaces, stoves, portable heaters	1%	—	—	7%
Other or none	3%	—	1%	—
COOLING SYSTEM				
Central	34%	38%	35%	25%
Room unit	32%	39%	32%	39%

Cleveland

In an attempt to inject life into the moribund new housing market local builders last year offered a $2,000 rebate [illegible] buyers, a promotion that moved about 200 homes.

However, new housing for the Cleveland area is expected to hover at 1,500 units, down 50% from 1980, and far below the 10,000 units built in 1977.

As with other northern cities, gas rates are a source of constant complaint. Cleveland suburbs served by Columbia Gas of Ohio are livid over the disparity in gas prices they must pay and those of East Ohio Gas Co. which are about $33 cheaper per month.

Ten counties served by Columbia Gas would like to cut their franchise agreements and switch to East Ohio if no relief is granted.

Fuel switching – from oil to gas – has declined, says contractor Al DiLauro, Jr., of Cleveland Air Comfort. "In the 1980-81 heating season we had more conversion jobs than we could handle, but that's slowed down now."

However, higher efficiency equipment finds a receptive audience in the Cleveland area, says Chuck Cramer of R.J. Heating & Cooling Co. "The homeowner is receptive. A lot of institutional type of advertising has been done by the utilities and manufacturers, so buyers know what it's all about."

Age of heating system, single-family, owner occupied

398,700 units

Years old	% of total
0 to 3	12%
4 to 10	17%
11 to 20	33%
21 to 40	27%
41-plus	1%
No response	10%

Average shipments to area

Furnaces	**13,000**
Heat pumps	**5,000**
Central air conditioners	**12,000**
Humidifiers	**8,000**
Boilers	**1,000**
Vent dampers	**6,000**

SATURATION PATTERNS

705,000 housing units

	Single family 432,000	Multi family 273,000	Owner occupied 451,000	Renter occupied 254,000
FUEL USE				
Utility gas	90%	93%	91%	92%
Bottled or LP gas	—	—	—	—
Fuel oil	8%	4%	6%	7%
Electricity	2%	2%	2%	1%
Other or none	—	1%	1%	—
HEATING SYSTEM				
Warm air furnace	87%	68%	89%	64%
Steam or hot water	9%	25%	10%	28%
Built-in electric units	—	1%	—	1%
Floor, wall, pipeless furnaces	1%	—	—	1%
Room heaters	1%	5%	—	5%
Fireplaces, stoves, portable heaters	—	—	—	—
Other or none	2%	1%	1%	1%
COOLING SYSTEM				
Central	15%	13%	16%	12%
Room unit	31%	29%	32%	28%

The A.O. Smith PSC air moving motor.

Rugged design. Proven performance. What's in it for you?

Rugged design - rugged construction!

Here's a new line of multi-speed, single phase PSC replacement motors — specifically designed to deliver year after year of trouble-free performance. Tough steel main frames are finished using special corrosion-resistant epoxy paint. Quiet sleeve bearings feature a superior bearing-lubricant-sealing system. Nylatron flinger rings on both ends result in a positive seal for quiet efficiency and long term reliability.

Lab and field proven reliability.

Over two million A. O. Smith PSC motors are currently in use. The heating and air conditioning industry counts on these air moving motors for central air conditioners, ventilating fans, exhaust fans, condenser fans, room air conditioners, air handlers, furnace blowers and heat pumps. U.L. recognized and C.S.A. certified components.

Variety of shaft configurations.

The shaft diameter and lengths available in this distributor product line have been carefully chosen to provide versatility in replacing motors now in service. A. O. Smith PSC motors are ideal replacements for both commercial and residential service.

Expect something special!

Backed by our design, application assistance and extensive product service organization, an A. O. Smith motor means long term, dependable performance. And each A. O. Smith motor carton is clearly labeled and color coded to give you the information you need, at a glance. For a list of distributors, or details of our distributor program, write A.O. Smith Corporation, Aftermarket Motor Operations, 6262 Executive Blvd., Dayton, Ohio 45424, Or call (513) 233-0004.

EXPECT SOMETHING SPECIAL

AO Smith
ELECTRIC MOTOR DIVISION

SIX REASONS WHY YOU SHOULD BUY FROM A FAST PARTS PLACE.

1. ONE YEAR WARRANTY

Any *FAST* part you buy from a *FAST* parts distributor is protected with a 12 month warranty!…Whether or not the original manufacturer does, *we stand behind every part we sell for 12 months.* Ask your *FAST* parts distributor for details.*

2. COMPETITIVE PRICES

Virtually every *FAST* part is priced as low or lower than competitive parts, even though you get 12 month protection and fast service with *FAST* parts.

3. FAST 48 HOUR SERVICE

If your *FAST* parts distributor is temporarily out of stock, he can call on a million dollar inventory. Parts in stock will be *shipped out within* 48 hours for emergency orders. No more 2 to 3 weeks wait for a part to be shipped.

4. A 96% AVAILABILITY

With a million dollar back up inventory, your *FAST* parts distributor can provide you 96% parts availability!

5. HIGH QUALITY PARTS

Every *FAST* part is manufactured by the leading maker of that part… they're good enough that we stand behind each one with a *12 month warranty!*

6. FAST UNIVERSAL REPLACEMENT PARTS

Your *FAST* parts distributor carries an extensive line of universal replacement parts…fan blades, motors, compressors, valves, controls, etc. to fit many needs. That lowers your inventories and makes you more money!

Next time you think about repair or replacement parts for heating or air conditioning units, call your *FAST* parts distributor listed at right.

fast®

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*For one year after the date of installation Heil-Quaker Corporation's FAST parts distributors will issue credit for or replace any defective FAST part returned to the distributor. Parts must be installed in accordance with good trade practices. Any resulting labor, material, refrigerant and/or freight charges associated with the repair will be the dealer's responsibility. This warranty does not cover: damages caused by accident, abuse, negligence, misuse, riot, fire, flood, Acts of God, improper matching or application, any expense incurred for erecting, disconnection, or dismantling in replacing parts, any incidental, consequential, or special damages or expenses in connection with any use or failure of FAST parts.

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Birmingham • Wittichen Supply Co.
Decatur • Wittichen Supply Co.
Dothan • Lewis Smith Corp.
Gadsden • Wittichen Supply Co.
Huntsville • Wittichen Supply Co.
Mobile • A & P Distributors
Mobile • Warrior Hinkle, Inc.
Montgomery • Sid Harvey Mid-South
Montgomery • Thompson Supply Co.
Opelika • Opelika Plumbing Supply Co.
Sheffield • Wittichen Supply Co.
Tuscaloosa • Fletcher Supply Co.
Tuscaloosa • Wittichen Supply Co.

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Phoenix • Pameco-Aire
Tempe • Pameco-Aire
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ARKANSAS
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Ft. Smith • Temple Supply
Jonesboro • N. O. Nelson Co.
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N. Little Rock • Air Conditioning Products Div.
Searcy • Searcy Nelectric
Walnut Ridge • N. O. Nelson Co.

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Bakersfield • Pameco-Aire
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Marysville • Pameco-Aire
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Montclair • Pameco-Aire
N. Hollywood • Pameco-Aire
Oakland • Pameco-Aire
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Pacoima • Fab Steel Supply, Inc.
Redding • Pameco-Aire
Roseville • Pameco-Aire
Sacramento • Associated Supply Co.
Sacramento • Pameco-Aire
San Bernardino • Pameco-Aire
San Francisco • Pameco-Aire
San Francisco • Refrigerating & Power Specialist
San Jose • Pameco-Aire
Santa Rosa • Pameco-Aire
Stockton • Pameco-Aire
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Visalia • Pameco-Aire

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Centerbrook • N. O. Nelson Centerbrook
Colchester • N. O. Nelson Colchester
Manchester • N. O. Nelson Aire Care
Manchester • N. O. Nelson Manchester
Shelton • Shelton Winair Co.
South Norwalk • Standard Supply of Conn.
West Hartford • Climate Equipment, Inc.

DELAWARE
Dover • R. E. Michel Co.
Wilmington • R. E. Michel Co.

DISTRICT OF COLUMBIA
Washington • R. E. Michel Co.

FLORIDA
Clearwater • Plumbing Systems, Inc.
Daytona Beach • Sid Harvey of Florida, Inc.
Ft. Lauderdale • L. Lobdell & Co., Inc.
Jacksonville • Dependable Air Distributors
Jacksonville • Cain & Bultman, Inc.
Jacksonville • Sid Harvey of Florida
Miami • Cain & Bultman, Inc.
Orlando • Cain & Bultman, Inc.
Panama City • Tri-State Heating & Air
Pensacola • Warrior Hinkle, Inc.
St. Petersburg • Florida Heating & Cooling
Tallahassee • Tri-State Heating & Air
Tampa • Cain & Bultman, Inc.
Tampa • Sid Harvey of Florida, Inc.

GEORGIA
Athens • Mechanical Equipment Co., Inc.
Atlanta • Graves Refrigeration, Inc.
Atlanta • Thalben Lloyd Co.
Atlanta • Sid Harvey of Atlanta, Inc.
Augusta • Graves Refrigeration, Inc.
Chamblee • Graves Refrigeration, Inc.
Columbus • Graves of Columbus
Gainesville • Mechanical Equipment Co., Inc.
Lawrenceville • Mechanical Equipment Co., Inc.
Marietta • Graves Refrigeration, Inc.
Mountain View • Graves Refrigeration, Inc.
Rome • Graves Refrigeration, Inc.
Stone Mountain • Graves Refrigeration, Inc.

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Lisle • Chicago Furnace Supply
Marion • Crescent Parts & Equip.
Mattoon • Central Wholesale Supply
Moline • Adel Furnace Wholesalers, Inc.
Morris • Munch Supply Co.
Mundelein • Chicago Furnace Supply
Peoria • Klaus Radio, Inc.
Peoria • Sheet Metal Products Co.
Quincy • Crescent of Quincy
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Bettendorf • Adel Furnace Wholesalers, Inc.
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Dodge City • RECO Refrig. Equip.
Emporia • Morgan Supply, Inc.
Hays • RECO Refrig. Equip.
Lenexa • Midwest Sales Division - Whirlpool
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Salina • The Lee Company
Salina • Morgan Supply, Inc.
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Wichita • RECO Refrig. Equip.

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Bowling Green • Bowling Green Nelsco Supply
Bowling Green • Brock McVey Refrigeration Supply
Corbin • Brock McVey Refrigeration Supply
Covington • Corken Steel Products
Hopkinsville • Cayce Mill Supply
Lexington • Brock McVey Refrigeration Supply
Lexington • South Central Co.
Louisville • Louisville Mill Supply Co.
Owensboro • National Temperature Control
Prestonsburg • Brock McVey Refrigeration Supply
Whitesburg • Reedy Distributing Co.

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Harahan • Mischer Wholesale Air Cond.
Harahan • Sid Harvey Standard AC & Refrigeration
Lafayette • Acme Refrigeration of Baton Rouge
Lafayette • Sid Harvey Standard AC & Refrig.
Monroe • Westbrook Co.
New Orleans • Sid Harvey Standard AC & Refrig.
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Linthicum Heights • R. E. Michel Co.
Rockville • R. E. Michel Co.
Salisbury • R. E. Michel Co.
Waldorf • R. E. Michel Co.

MASSACHUSETTS
Springfield • Springfield Plumbing Supply

MICHIGAN
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Benton Harbor • Valley Equipment Co.
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Gaylord • H. F. Middlebrook & Sons
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Minneapolis • Shurall Supply, Inc.
Minneapolis • Thermal Co., Inc.
Rochester • Thermal Co., Inc.
St. Cloud • Bartley Supply Co.
St. Paul • Thermal Co., Inc.

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Jackson • Kennare Oliver Co.
Jackson • Warrior Hinkle, Inc.

MISSOURI
Arnold • Crescent Parts & Equipment
Cape Girardeau • Wholesale Supply
Columbia • RECO Refrig. Equip. Co.
Maryland Hts. • Mechanical Supply
Sedalia • Tallman Co. of Sedalia, Inc.
Sikeston • Wholesale Supply
St. Joseph • H. Ehrlich & Sons
St. Louis • Crescent Parts & Equipment
St. Louis • Mechanical Supply

MONTANA
Billings • ABCO Supply, Inc.

NEBRASKA
Lincoln • Paramount Supply Co.
Omaha • Air Conditioning Utilities, Inc.
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NEVADA
Las Vegas • Pameco-Aire
Reno • Pameco-Aire

NEW HAMPSHIRE
Concord • Capitol Plumbing & Heating
Keene • Capitol Plumbing & Heating
Nashua • Capitol Plumbing & Heating
Nashua • Total Air Supply, Inc.

NEW JERSEY
Cedar Knolls • Amber Supply Co.
Cherry Hill • Sid Harvey of Pennsylvania
Clifton • Sid Harvey of New Jersey
Edison • Sid Harvey of New Jersey
Highland Park • E & J Plumbing Supply
Manasquan • Dunphey Smith Co.
Newark • Sid Harvey of New Jersey
Pleasantville • Taylor Supply Co.
Roselle Park • Sid Harvey of New Jersey
Trenton • Acar Supply
Trenton • Sid Harvey of New Jersey
Union • Dunphey Smith Company
Union City • Sid Harvey of New Jersey
Vineland • R. E. Michel Co.
Wharton • Amber Supply Co.

NEW YORK
Albany • Sid Harvey of Albany
Binghamton • Binghamton Hardware
Binghamton • Northrup Supply Corp.
Brewster • N & S Supply Co.
Buffalo • Climate Equipment & Supply
Buffalo • Ier Supply Co.
Catskill • N & S Supply Co.
East Aurora • Ier Supply Co.
Fishkill • N & S Supply Co.
Fredonia • Ier Supply Co.
Garden City • Sid Harvey of New York
Geneva • Northrup Supply Corp.
Glens Falls • Northrup Supply Corp.
Horseheads • Northrup Supply Corp.
Ilion • Northrup Supply Corp.
Jamestown • Ier Supply Co.
Lancaster • Ier Supply Co.
Lockport • Ier Supply Co.
Mt. Vernon • Eastern Mechanical Supply
N. Tonawanda • Ier Supply Co.
Oneonta • Northrup Supply Corp.
Patchogue • Winkler Long Island, Inc.
Rochester • Climate Equipment & Supply
Syracuse • C & C Distributors

NORTH CAROLINA
Charlotte • Graves of Charlotte
Charlotte • Kinsiah Distributing Co.
Durham • Sid Harvey Hasco, Inc.
Fayetteville • Sid Harvey Hasco, Inc.
Fayetteville • Longley Supply Co.
Gastonia • Graves of Gastonia
Goldsboro • Dixie Supply Co.
Greenville • Dixie Supply Co.
Greensboro • Sid Harvey Hasco, Inc.
Greensboro • Graves of Greensboro
Hickory • Graves of Hickory
Matthews • Kinsiah Distributing Co.
Raleigh • Sid Harvey Hasco, Inc.
Rocky Mount • N. C. Supply Co.
Wilmington • Sid Harvey Hasco, Inc.
Wilmington • Longley Supply Co.
Winston Salem • Sid Harvey Hasco, Inc.

NORTH DAKOTA
Fargo • Shirley Olstad Co.
Mandan • Northwest Pipe Fittings
Minot • Lindsay Brothers Co.

OHIO
Cleveland • Cleveland Domestic & Supply
Columbus • Columbus Winair Supply Co.
Dayton • Ohio Furnace Supply
Middleport • City Ice & Fuel Co.
Toledo • Heating Trades Suppliers, Inc.

OKLAHOMA
Enid • N. O. Nelson Co.
Muskogee • F & H Supply
Oklahoma City • Comfort Distributors, Inc.
Oklahoma City • Delaney's, Inc.

PENNSYLVANIA
Ardmore • R. E. Michel Co.
Erie • Till Distributing, Inc.
Harrisburg • R. E. Michel Co.
King of Prussia • Sid Harvey of Pennsylvania
Lancaster • Acar Supply
Lemoyne • Appleby Bros. & Whittaker
Philadelphia • Acar Supply Co.
Philadelphia • Flame Supply Co.
Philadelphia • Sid Harvey Victor, Inc.
Pittsburgh • Rodgers & Geiger Supply Co.
Reading • Acar Supply
Trenton • Acar Supply
Warminster • Acar Supply
Wilmington • Acar Supply

RHODE ISLAND
Warwick • One Stop Supply

SOUTH CAROLINA
Columbia • Epting Distributors
Columbia • Specialties, Inc.
Conway • Epting Distributors of Conway
Greenville • Graves Refrigeration, Inc.
N. Charleston • Ott Distributors
Spartanburg • Epting Distributors of Spartanburg
Sumter • Longley Supply Co.

SOUTH DAKOTA
Sioux Falls • Lindsay Brothers Co.
Sioux Falls • Thermal Co., Inc.

TENNESSEE
Adamsville • Duren Supply Co., Inc.
Bristol • Roden Electric Supply Co.
Chattanooga • J & P Supply
Clarksville • NSM Suppliers, Inc.
Hendersonville • Nashville Sht. Mtl. Suppliers, Inc.
Knoxville • Roden Electric Supply Co.
LaFollette • Roden Electric Supply Co.
Memphis • Sid Harvey Mid-South, Inc.
Memphis • Woodson & Bozeman, Inc.
Morristown • East Tenn. Temperature Control
Nashville • Comfort Supply, Inc.
Nashville • Nashville Sheet Metal Suppliers, Inc.
Oak Ridge • Roden Electric Supply Co.
Pigeon Forge • Roden Electric Supply Co.

TEXAS
Amarillo • Air Con Supply Co.
Arlington • Service Man Suppliers, Inc.
Austin • Westbrook Co.
Beaumont • Sid Harvey Standard AC & Refrig.
Brenham • Westbrook Co.
Corpus Christi • Westbrook Co.
Dallas • Mischer Wholesale Air Cond.
Ft. Worth • Mischer Wholesale Air Cond.
Houston • Whirlpool Corp. Houston Parts Br.
Houston • Mischer Wholesale Air Cond.
Houston • Sid Harvey Standard AC & Refrigeration
Houston • Westbrook Co.
Lubbock • C & M Wholesale Supply Co.
Nacogdoches • Westbrook Co.
Palestine • Westbrook Co.
Pasadena • Westbrook Co.
Port Arthur • Sid Harvey Standard AC & Refrig.
Rosenberg • Westbrook Co.
San Antonio • Washing Machine Parts Co.
San Antonio • Westbrook Co.
San Marcos • Westbrook Co.
Temple • Westbrook Co.
Texas City • Westbrook Co.
Tyler • Westbrook Co.
Waco • Westbrook Co.

UTAH
Salt Lake City • S-R Distributing Co.

VERMONT
Rutland • Campbell Supply Corp.

VIRGINIA
Arlington • R. E. Michel Co.
Bristol • Southern Refrigeration
Chesapeake • Superior Equipment Sales, Inc.
Danville • Southern Refrigeration
Harrisonburg • Southern Refrigeration
Lynchburg • R. E. Michel Co.
Lynchburg • Southern Refrigeration
Newport News • R. E. Michel Co.
Norfolk • R. E. Michel Co.
Richmond • R. E. Michel Co.
Roanoke • Southern Refrigeration

WASHINGTON
Kent • Tempco Distributors

WEST VIRGINIA
Beckley • Raleigh Hardware Co.
Clendenin • Clendenin Lumber Supply
Nitro • Midwest Corp.
Point Pleasant • City Ice & Fuel Co.
S. Charleston • Danzer, Inc.
Wheeling • Hill Supply, Inc.

WISCONSIN
Appleton • Service & Supply Co., Inc.
Germantown • Monroe Gas Equipment
Green Bay • Morley Murphy Co.
LaCrosse • Lindsay Brothers Co.
Madison • Mott Brothers Co.
Milwaukee • Auer Steel & Heating
Wausau • Lindsay Brothers Co.
Wausau • Morley Murphy Co.
Wisconsin Rapids • Mid States Supply

WYOMING
Casper • Casper Winair Supply Co.

CANADA
Barrie • Marshall Refrigeration Co., Ltd.
Belleville • Marshall Refrigeration Co., Ltd.
Hamilton • Marshall Refrigeration Co., Ltd.
Kingston • Marshall Refrigeration Co., Ltd.
St. Catharines • Marshall Refrigeration Co., Ltd.
Thornhill • Marshall Refrigeration Co., Ltd.
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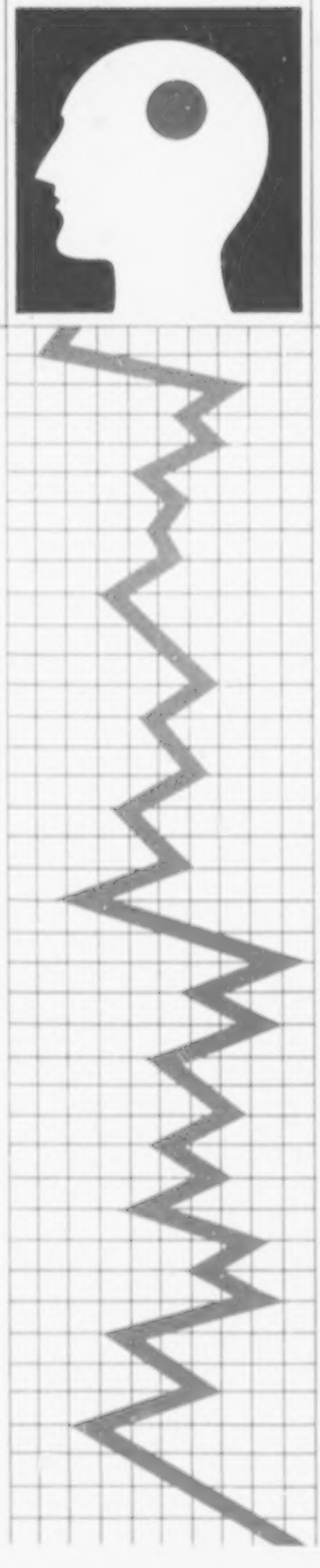

Energy Management Ideas from Detroit Edison

Heat pump space conditioning can help lower the cost of doing business.

Whether you're an architect/designer or a contractor, you can help your clients lower their cost of doing business by specifying a heat pump space-heating system. You can connect a heat pump to most electric, gas, oil or L.P. forced-air heating systems with no, or minimal, modification.

A heat pump lowers costs because it moves the natural heat, that's always present in the outside air, inside to heat any kind of building. The heating system only has to go to work when the outside temperature is below freezing.

A Detroit Edison Specialist can give you straight answers on heat pump savings and recommend the kind of heat pump that will do the best job for any business. He can also recommend economical and efficient methods to improve interior and security lighting, assist you in selecting waste heat recovery equipment and advise you on maintenance schedules to keep all machinery operating more efficiently.

Whatever your business, energy management is a lot simpler when you can depend on a reliable power source. And you can in Southeastern Michigan because Detroit Edison provides this area with electricity that's more than 90 percent generated from abundant coal.

So take advantage of Detroit Edison's vast energy experience and set up an appointment with one of our Specialists soon. Call (313) 237-9228 or write Energy Management, Detroit Edison, 348 WCB, 2000 Second Avenue, Detroit, Michigan 48226.

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in your hands.**

Detroit

Michigan electric utilities are now required by state law to offer "lifeline" rates to residential customers, a plan designed to encourage energy conservation. In general, electric rates are based on the number of persons living in the household.

The new plan's effect on heating-cooling equipment has yet to be felt, either as a first-choice or as a replacement, but the metropolitan Detroit area is a cockpit in which three large utilities (one gas, one electric, one mixed) compete aggressively for home heating fuel dominance.

For example, Detroit Edison hopes to add 2,000 heat pumps a year to local homes -- 70% of them add-ons. It has also gotten state approval for a reduced rate for an experimental add-on of electric resistance duct heaters for 100 homes now heated with fuel oil.

Add-on heat pumps may become more attractive against constantly escalating natural gas and oil prices. Local homeowners, faced with a 50% hike in gas prices from Michigan Consolidated Gas, have protested vigorously.

Higher gas prices, originally scheduled to take effect in January of 1982, have been delayed, but fuel users are bracing themselves.

A veteran dealer, Walt Reckinger, sees the market for add-on heat pumps primarily among the "hundreds of thousands" of older furnaces with efficiencies in the 60% and lower range.

Age of heating system, single-family, owner occupied

930,900 units

Years old	% of total
0 to 3	13%
4 to 10	22%
11 to 20	34%
21 to 40	21%
41-plus	2%
No response	8%

Average shipments to area

Furnaces	40,000
Heat pumps	1,000
Central air conditioners	22,000
Humidifiers	20,000
Boilers	1,000
Vent dampers	12,000

SATURATION PATTERNS

1,394,000 housing units

	Single family 920,400	Multi family 473,600	Owner occupied 975,800	Renter occupied 418,200
FUEL USE				
Utility gas	89%	82%	89%	79%
Bottled or LP gas	1%	—	1%	—
Fuel oil	7%	7%	8%	8%
Electricity	2%	9%	2%	8%
Other or none	1%	2%	—	5%
HEATING SYSTEM				
Warm air furnace	88%	56%	89%	58%
Steam or hot water	9%	37%	9%	34%
Built-in electric units	—	5%	—	4%
Floor, wall, pipeless furnaces	2%	2%	1%	3%
Room heaters	1%	—	1%	1%
Fireplaces, stoves, portable heaters	—	—	—	—
Other or none	—	—	—	—
COOLING SYSTEM				
Central	20%	19%	22%	13%
Room unit	29%	22%	30%	19%

Indianapolis

Indianapolis electric rates are among the lowest in the nation giving the add-on electric heat pump a strong impetus.

This market absorbed a great volume of heat pumps during the gas moratorium in the 1970's, and while gas has reclaimed its former dominance as a home heating fuel, electric add-on heat pumps have remained a favorite new builder item. At a recent home show, eight of the models had this feature.

Indianapolis Power & Light Co. is now experimenting with an add-on heat pump in several homes, alternating with a fossil fuel system every 24 hours.

"There's a heat pump system balance point and an economical balance point, and they may vary greatly," says Thomas Moore, a utility executive. "The system balance point may be 20°F, while the economic balance point may be as low as 10°F."

Heat pump claims are contested by Citizens Gas & Coke Utility, which has added more than 24,000 new residential accounts to its lines since the gas moratorium was lifted in 1978. It estimates there are about 12,000 eligible oil-fired homes remaining in its service territory, and claims that its fuel is about 75% less costly than oil.

However, gas prices are expected to increase by 15% to 20% annually, which will make it less attractive against oil prices.

Age of heating system, single-family, owner occupied

268,000 units

Years old	% of total
0 to 3	16%
4 to 10	29%
11 to 20	34%
21 to 40	19%
41-plus	—
No response	2%

Average shipments to area

Furnaces	9,000
Heat pumps	6,000
Central air conditioners	15,000
Humidifiers	8,000
Vent dampers	6,000

SATURATION PATTERNS

423,000 housing units

	Single family 310,000	Multi family 113,000	Owner occupied 270,000	Renter occupied 153,000
FUEL USE				
Utility gas	55%	51%	54%	55%
Bottled or LP gas	2%	—	2%	1%
Fuel oil	27%	11%	26%	16%
Electricity	15%	38%	18%	28%
Other or none	1%	—	—	—
HEATING SYSTEM				
Warm air furnace	84%	64%	84%	70%
Steam or hot water	2%	13%	2%	9%
Built-in electric units	10%	19%	11%	13%
Floor, wall, pipeless furnaces	—	3%	3%	2%
Room heaters	4%	3%	3%	2%
Fireplaces, stoves, portable heaters	—	1%	—	5%
Other or none	—	—	—	1%
COOLING SYSTEM				
Central	41%	46%	43%	41%
Room unit	26%	21%	28%	20%

Kansas City

Efficiency levels of air conditioning equipment are increasing in the Kansas City area, according to a recent survey by Kansas City Power & Light Co.

Distributors surveyed by the utility show that last year, units with a seasonal energy efficiency ratio (SEER) of 8.0 or more made up 78% of their sales. That's an increase of 12% from 1980. The same survey showed that 13% of volume is above the 9.0 SEER level.

However, business has tailed off here. A cool, rainy summer in 1981, followed by ballooning interest rates and the precipitous decline in new housing, has severely dampened sales.

"Last spring started off very good, and people remembered the scorcher of a summer we had in 1980," recalls Guy W. Johnson of Johnson Furnace Co. "Everybody who had a hammer was driving a few nails, new housing looked promising, and then everything just stopped."

However, he thinks this summer may see a modest recovery of new housing, even though "the last house built last year may still be for sale this spring."

His reasoning: "Guys have been sitting home all winter and they'll be out building. If the houses sell, they'll build some more; if not, it'll just die."

Age of heating system, single-family, owner occupied

315,000 units

Years old	% of total
0 to 3	18%
4 to 10	21%
11 to 20	30%
21 to 40	21%
41-plus	1%
No response	9%

Average shipments to area

Furnaces	20,000
Heat pumps	3,000
Central air conditioners	25,000
Humidifiers	6,000
Vent dampers	5,000

SATURATION PATTERNS

488,000 housing units

	Single family 384,000	Multi family 104,000	Owner occupied 302,000	Renter occupied 186,000
FUEL USE				
Utility gas	94%	90%	94%	91%
Bottled or LP gas	3%	—	2%	3%
Fuel oil	1%	3%	1%	2%
Electricity	2%	6%	2%	4%
Other or none	—	1%	1%	—
HEATING SYSTEM				
Warm air furnace	88%	64%	90%	70%
Steam or hot water	3%	33%	3%	21%
Built-in electric units	1%	—	1%	—
Floor, wall, pipeless furnaces	3%	—	3%	5%
Room heaters	2%	03%	2%	3%
Fireplaces, stoves, portable heaters	2%	—	—	1%
Other or none	1%	—	1%	1%
COOLING SYSTEM				
Central	48%	39%	52%	33%
Room unit	37%	26%	35%	35%

Milwaukee

Milwaukee was one of the first major cities to embrace automatic vent dampers enthusiastically, and four heating seasons after the first retrofit installations were made, the product remains a strong profit-builder for contractors.

The area absorbs about 10,000 dampers annually, of which the lion's share are thermally actuated units, according to distributor Frank Shibilski, who was one of the first to mass merchandise a line of electrically actuated dampers.

"But this market will decline gradually, and the market for entirely new replacement furnaces will give the contractor a much better sales story – and a much better profit margin," he says. "Milwaukee has a lot of very old forced air systems, and the exaggerated energy savings claims of some vent damper manufacturers has caused some skepticism by homeowners."

Contractor Tom Smith sees a definite slackening of conversions from oil to gas, as homeowners brace for deregulation of that fuel and its price rise. Add-on heat pumps, which Smith and a few other contractors have pioneered, now represent a fairly strong portion of air conditioning installations.

"We're selling them mainly in the heating mode, and my own inventory will be about 50% heat pumps. In the next 10 years, you're going to see a surprisingly high percentage of heat pumps sold as an energy conservation device," he believes.

Age of heating system, single-family, owner occupied

265,000 units

Years old	% of total
0 to 3	15%
4 to 10	15%
11 to 20	35%
21 to 40	30%
41-plus	3%
No response	2%

Average shipments to area

Furnaces	14,000
Heat pumps	2,000
Central air conditioners	10,000
Humidifiers	10,000
Boilers	1,000
Vent dampers	9,000

SATURATION PATTERNS

536,000 housing units

	Single family 284,000	Multi family 232,000	Owner occupied 332,000	Renter occupied 204,000
FUEL USE				
Utility gas	72%	80%	72%	82%
Bottled or LP gas	—	—	—	—
Fuel oil	27%	14%	27%	11%
Electricity	—	5%	1%	6%
Other or none	—	1%	—	1%
HEATING SYSTEM				
Warm air furnace	84%	57%	81%	58%
Steam or hot water	12%	35%	14%	33%
Built-in electric units	1%	5%	1%	5%
Floor, wall, pipeless furnaces	1%	2%	1%	1%
Room heaters	2%	—	2%	2%
Fireplaces, stoves, portable heaters	—	1%	—	1%
Other or none	—	—	1%	1%
COOLING SYSTEM				
Central	25%	12%	24%	8%
Room unit	27%	37%	30%	34%

Minneapolis

About 800 heating-cooling contractors have signed up to get on the master list of approved installers under the Minnesota Residential Conservation Service (RCS) program, although the amount of business the audit program has generated for them is negligible.

Of the approximately 2,000 audits performed during 1981, about 10% of the homeowners indicated they would consider buying a replacement furnace; however, long payback periods generally cause residents to keep an existing heating plant in place until it breaks down totally.

One residential heating specialist, Lowell Anderson of Chronstrom Heating and Air Conditioning, sees a lot of new construction contractors moving into the home replacement retrofit market. "You've got more people crowding into the same market, bidding lower, and reducing the size of the pie to be cut up," he says.

State law requires furnaces to be equipped with spark ignition systems, reflecting an effort to conserve energy. "But most Minnesota homeowners are conservative anyway, and many of them have already made corrections to make their houses more energy efficient," Anderson says.

Many local contractors expect residential service and installation volume to improve, following a decision by the Minnesota Public Utility Commission that forbids Minnesota Gas Company to charge free or below-cost rates for these services.

Age of heating system, single-family, owner occupied

437,000 units

Years old	% of total
0 to 3	15%
4 to 10	18%
11 to 20	28%
21 to 40	25%
41-plus	7%
No response	7%

Average shipments to area

Furnaces	25,000
Heat pumps	2,000
Central air conditioners	20,000
Humidifiers	10,000
Boilers	2,000
Vent dampers	8,000

SATURATION PATTERNS

679,000 housing units

	Single family 467,000	Multi family 212,000	Owner occupied 441,000	Renter occupied 238,000
FUEL USE				
Utility gas	86%	83%	85%	86%
Bottled or LP gas	2%	—	2%	—
Fuel oil	9%	12%	10%	10%
Electricity	3%	4%	2%	3%
Other or none	—	1%	1%	1%
HEATING SYSTEM				
Warm air furnace	77%	21%	76%	26%
Steam or hot water	17%	68%	18%	62%
Built-in electric units	1%	1%	1%	1%
Floor, wall, pipeless furnaces	2%	5%	3%	5%
Room heaters	3%	4%	1%	5%
Fireplaces, stoves, portable heaters	—	—	1%	—
Other or none	—	1%	—	1%
COOLING SYSTEM				
Central	24%	15%	29%	13%
Room unit	34%	40%	34%	40%

St. Louis

In this corner, the Laclede Gas Company, which wants to add a $90 annual surcharge to its residential customers who install an add-on heat pump; in this corner, contractor Bob Dierberg, who thinks the surcharge penalizes homeowners who try to save energy.

The two sides are fighting it out in public hearings being held this spring. Comparable gas surcharge proposals in Washington, D.C., and Columbus, Ohio, have been beaten back, but Laclede Gas has taken a tough stance on the issue.

The stakes are high, because St. Louis is an excellent replacement market, ideal for the add-on heat pump. Its climate combines a long, humid cooling season with a (usually) long, cold heating season.

However, business is off sharply. Bill Rundquist of Air Masters says his leads for add-on and replacement jobs are down about one-third of what they were for the first quarter of last year.

Heat pumps go in at the rate of about 4,000 a year, but even these may find stiffened customer resistance. Sold on a long-term payback basis, heat pumps still have to compete with gas that is still relatively cheap.

"The expense of replacing a fossil system with a heat pump would be hard to justify in recovery," says Rob Matheny of Matheny Heating & Cooling Service.

Age of heating system, single-family, owner occupied

517,000 units

Years old	% of total
0 to 3	13%
4 to 10	22%
11 to 20	41%
21 to 40	19%
41-plus	1%
No response	4%

Average shipments to area

Furnaces	**25,000**
Heat pumps	**5,000**
Central air conditioners	**30,000**
Humidifiers	**5,000**
Boilers	**500**
Vent dampers	**4,000**

SATURATION PATTERNS

802,000 housing units

	Single family 572,000	Multi family 230,000	Owner occupied 505,000	Renter occupied 297,000
FUEL USE				
Utility gas	80%	76%	79%	79%
Bottled or LP gas	7%	—	7%	1%
Fuel oil	9%	4%	9%	4%
Electricity	3%	20%	4%	15%
Other or none	1%	—	1%	1%
HEATING SYSTEM				
Warm air furnace	90%	56%	89%	65%
Steam or hot water	5%	21%	6%	18%
Built-in electric units	1%	17%	2%	5%
Floor, wall, pipeless furnaces	1%	6%	1%	1%
Room heaters	2%	—	2%	10%
Fireplaces, stoves, portable heaters	—	—	—	1%
Other or none	1%	—	—	1%
COOLING SYSTEM				
Central	54%	31%	55%	31%
Room unit	29%	34%	30%	34%

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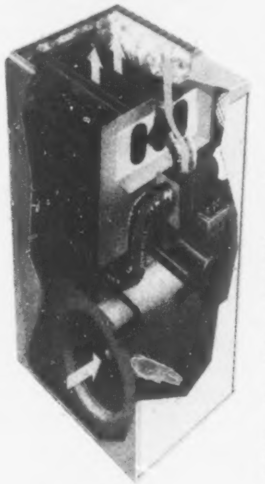

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If you're using all-electric heat…	$799	$2,693	$4,943	66%
…an all-electric heat pump…	$348	$1,173	$2,091	44%
…an old gas furnace…	$154	$ 522	$1,136	31%
…an "add-on" heat pump…	$150	$ 506	$ 855	23%

(Based on average energy consumption data of selected northern U.S. regions and on the U.S. Department of Energy national average energy cost.)

Ten Upflow and Downflow Models

Recuperative Furnace Specifications

Model Number	Input BTUH	Heating Capacity BTUH*	Seasonal Efficiency*	Dimensions (In.) W	H	D
UPFLOW MODELS						
UR 040D10	40,000	35,000	86.9	18	48¼	28
UR 060D14	60,000	52,000	86.7	18	48¼	28
UR 080D14	80,000	69,000	85.5	18	48¼	28
UR 100D16	100,000	86,000	85.8	24	48¼	28
UR 120D16	120,000	103,000	85.7	24	48¼	28
DOWNFLOW MODELS						
DR 040D10	40,000	35,000	86.8	18	53	28
DR 060D14	60,000	52,000	87.0	18	53	28
DR 080D14	80,000	69,000	86.0	18	53	28
DR 100D16	100,000	87,000	85.6	24	53	28
DR 120D16	120,000	104,000	85.5	24	53	28

*Capacity Ratings in Accordance with U.S. Government Standard Tests

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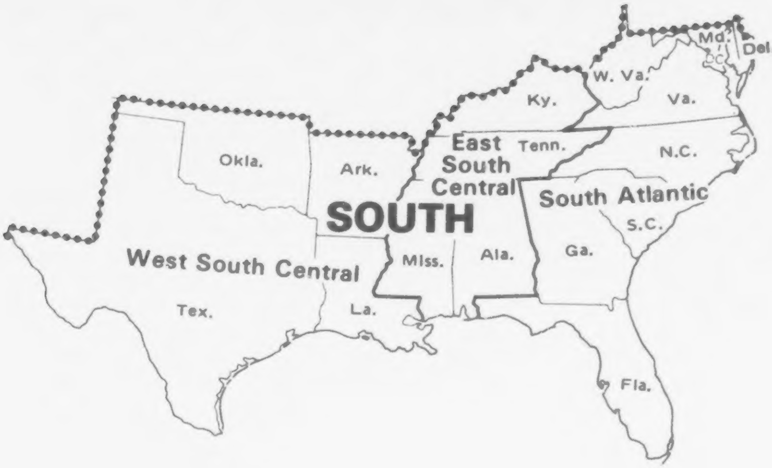
South



Nearly one of two homes built in America is in the South, whose share of the national inventory of homes is now about one-third.

New single-family housing in the South dropped by about 10% last year, a dip that reduced its intake of central air conditioning shipments by about 40,000 units. The current year's housing activity does not promise much improvement.

New last year was a pattern of electric utility initiatives to reduce peak electric demand. Their instrument is a rebate program that rewards high-efficiency heating-cooling systems in both existing and new homes. Such mega-markets as Houston, Dallas, Miami and Phoenix are now offering such rebates, and their impact on equipment selection promises to be significant.

SATURATION PATTERNS

25,094,000 housing units

	Single family 18,584,000	Multi family 6,510,000	Owner occupied 16,885,000	Renter occupied 8,208,000
FUEL USE				
Utility gas	50%	40%	47%	48%
Bottled or LP gas	9%	2%	10%	6%
Fuel oil	12%	11%	12%	11%
Electricity	22%	37%	25%	28%
Other or none	7%	10%	6%	7%
HEATING SYSTEM				
Warm air furnace	49%	74%	57%	43%
Steam or hot water	3%	7%	3%	6%
Built-in electric units	7%	9%	8%	8%
Floor, wall, pipeless furnaces	10%	6%	8%	9%
Room heaters	22%	6%	8%	9%
Fireplaces, stoves, portable heaters	4%	2%	17%	25%
Other or none	5%	2%	5%	—
COOLING SYSTEM				
Central	35%	46%	41%	33%
Room unit	34%	30%	36%	30%

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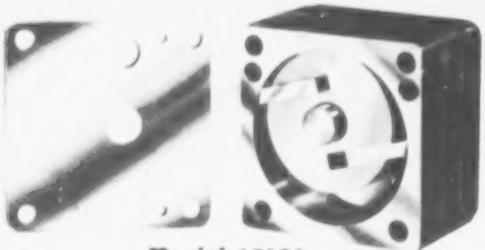

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Atlanta

Atlanta represents an annual residential market of about 14,000 new or replacement central air conditioners each year, according to a survey made by the Georgia Power Co.

That volume affects about 6% of its residential customers in its Atlanta service territory; company-wide, about 8% of its 1 million residential accounts added a new central system, or replaced one.

Because of plentiful, and relatively cheap, natural gas, Atlanta has not blossomed as a heat pump market in the way that other southern cities have. Heat pumps remain largely a condominium (13% saturation) system; their presence in single family homes is less than 5%, and they find their greatest popularity in housing units built since 1975.

Gas for house heating has about 85% of the Atlanta market, a share that will yield to electricity very slowly, if at all.

Supplemental heating systems have come on strong here; about 17% of all Atlanta homes have them, including 6,000 homes that use woodstoves.

An interesting phenomenon to watch here is the use of heat pump water heaters, which are an approved energy conservation measure in the Georgia Residential Conservation Service (RCS) Program. "Over the long haul, these water heaters are going to be a real plus in Georgia," says Robin Meyers, who runs the state's home audit program, but there has been no immediate increase in their use.

Age of heating system, singie-family, owner occupied

355,600 units

Years old	% of total
0 to 3	22%
4 to 10	29%
11 to 20	27%
21 to 40	11%
41-plus	1%
No response	10%

Average shipments to area

Furnaces	40,000
Heat pumps	6,000
Central air conditioners	45,000
Humidifiers	10,000
Vent dampers	2,000

SATURATION PATTERNS

647,000 housing units

	Single family 386,700	Multi family 261,200	Owner occupied 365,400	Renter occupied 282,000
FUEL USE				
Utility gas	90%	66%	89%	68%
Bottled or LP gas	4%	—	3%	2%
Fuel oil	1%	—	1%	1%
Electricity	5%	34%	7%	29%
Other or none	—	—	—	—
HEATING SYSTEM				
Warm air furnace	74%	74%	80%	61%
Steam or hot water	—	3%	—	1%
Built-in electric units	1%	1%	—	—
Floor, wall, pipeless furnaces	9%	4%	9%	4%
Room heaters	10%	16%	4%	18%
Fireplaces, stoves, portable heaters	6%	—	4%	—
Other or none	—	2%	3%	16%
COOLING SYSTEM				
Central	46%	53%	48%	52%
Room unit	26%	7%	26%	12%

Baltimore

Baltimore Gas and Electric Co. is going after 340,000 oil-heated homes with an add-on heat pump promotion which, if successful, will add significantly to the market's central air conditioning saturation, now put at about 38% by the utility.

Electric heat pumps now have about a 4% share of total homes here; 60% of new single-family homes built since 1978 have electric heat pumps. In addition, about 86% of all new homes built in the Baltimore area have electric heat pumps.

Average summer electric bills have risen very modestly here, averaging about $143, according to utility reports.

Local contractors believe that deregulation of natural gas will only add impetus to the already dynamic heat pump penetration here.

"We tell homeowners that with natural gas, they're only buying time until gas prices jump," says Michael Coyne, a long-time dealer/contractor.

"At the rate it's expected to climb, natural gas may soon go to 90% of what fuel oil is in the near future, so that makes the heat pump even more attractive.

With new construction off sharply here, many contractors are moving into the replacement market, which results in a lot of price-cutting.

Age of heating system, single-family, owner occupied

431,700 units

Years old	% of total
0 to 3	12%
4 to 10	19%
11 to 20	23%
21 to 40	28%
41-plus	5%
No response	13%

Average shipments to area

Furnaces	5,000
Heat pumps	10,000
Central air conditioners	15,000
Humidifiers	8,000
Boilers	2,000
Vent dampers	7,000

SATURATION PATTERNS

755,000 housing units

	Single family 537,000	Multi family 218,000	Owner occupied 430,000	Renter occupied 325,000
FUEL USE				
Utility gas	40%	57%	52%	53%
Bottled or LP gas	—	—	—	—
Fuel oil	41%	35%	40%	37%
Electricity	13%	8%	6%	10%
Other or none	6%	—	2%	—
HEATING SYSTEM				
Warm air furnace	66%	62%	60%	58%
Steam or hot water	31%	34%	34%	34%
Built-in electric units	1%	—	1%	2%
Floor, wall, pipeless furnaces	2%	—	2%	2%
Room heaters	—	1%	1%	2%
Fireplaces, stoves, portable heaters	—	1%	1%	2%
Other or none	—	—	—	—
COOLING SYSTEM				
Central	27%	56%	27%	43%
Room unit	44%	13%	43%	17%

Birmingham

Following a decade during which the saturation of window air conditioners has gradually declined, their penetration in the market has now stabilized, and has even risen slightly in some areas served by the Alabama Power Co.

This raises the question of whether homeowners with central cooling are now buying window units to spot cool their homes to save on the expense of whole house air conditioning. System – wide, the utility reports this pattern in fewer than 1% of the homes it serves.

Window units still lead homeowners into central cooling; about 4,000 Birmingham-area buyers report they will "trade up" from window units to central systems in the next two years.

Central systems sales will definitely not come from new housing, which is severely depressed here.

Contractors like Bob Williams of Standard Heating & Air Conditioning are finding a modestly rewarding market in the home renovation/remodeling business, working with home building contractors who have re-channeled their efforts in upgrading existing homes.

"These are hard times for everybody in Birmingham," Williams says. "We've put our own expansion plans on the back burner, and have had to go after business in ways we never did before."

In more flush times, leads generated by direct mail and advertising provided a steady source of income.

Age of heating system, single-family, owner occupied

199,200 units

Years old	% of total
0 to 3	23%
4 to 10	25%
11 to 20	24%
21 to 40	8%
41-plus	—
No response	20%

Average shipments to area

Furnaces	10,000
Heat pumps	6,000
Central air conditioners	17,000
Humidifiers	4,000
Vent dampers	1,000

SATURATION PATTERNS

319,000 housing units

	Single family 231,000	Multi family 72,000	Owner occupied 224,000	Renter occupied 95,000
FUEL USE				
Utility gas	70%	71%	72%	73%
Bottled or LP gas	16%	—	15%	6%
Fuel oil	—	—	—	—
Electricity	4%	1%	3%	1%
Other or none	—	1%	3%	1%
HEATING SYSTEM				
Warm air furnace	67%	37%	68%	36%
Steam or hot water	1%	3%	3%	2%
Built-in electric units	2%	5%	3%	3%
Floor, wall, pipeless furnaces	15%	26%	14%	18%
Room heaters	7%	25%	7%	35%
Fireplaces, stoves, portable heaters	5%	4%	3%	5%
Other or none	—	—	—	—
COOLING SYSTEM				
Central	49%	31%	48%	26%
Room unit	35%	30%	35%	33%

Dallas

The Dallas market, which absorbs a large slice of the central air conditioning market, has been slowed by the housing construction decline.

One big factor here is Frymire Engineering, which a year ago was installing about 42 heat pumps a day in the new housing of Fox and Jacobs Homebuilders; currently, they are down to about 18 installations a day.

"We're fortunate that commercial building has been as strong as ever, and we can move people within the organization," says Duane Bebee, who heads the service business for Frymire.

Texas Power & Light Company has had an impact on efficiency of central air conditioning systems and heat pumps, both for new housing and replacement, with its bonus incentive plan.

Through 1981, about 2,500 central systems and heat pumps out of a total replacement volume of 30,000 units have qualified for their incentive discount, which is applied to electric bills where central cooling has an 8.5 seasonal energy efficiency ratio (SEER) and where a heat pump has an SEER of 8.0 or more.

"When we started out, a lot of our equipment dealers had stocks of units that didn't qualify for the efficiency minimums, so they shipped them out to other areas," says Dave Patterson, of the utility.

Age of heating system, single-family, owner occupied

371,900 units

Years old	% of total
0 to 3	18%
4 to 10	22%
11 to 20	25%
21 to 40	8%
41-plus	1%
No response	25%

Average shipments to area

(Combined with Fort Worth)

Furnaces	**40,000**
Heat pumps	**10,000**
Central air conditioners	**80,000**
Humidifiers	**5,000**
Vent dampers	**1,000**

SATURATION PATTERNS

640,000 housing units

	Single family 443,000	Multi family 197,000	Owner occupied 345,000	Renter occupied 295,000
FUEL USE				
Utility gas	79%	37%	80%	46%
Bottled or LP gas	6%	—	4%	5%
Fuel oil	—	—	—	—
Electricity	14%	63%	15%	49%
Other or none	1%	—	1%	—
HEATING SYSTEM				
Warm air furnace	66%	78%	72%	70%
Steam or hot water	—	—	—	—
Built-in electric units	—	3%	—	3%
Floor, wall, pipeless furnaces	7%	11%	8%	5%
Room heaters	16%	8%	17%	19%
Fireplaces, stoves, portable heaters	10%	—	3%	3%
Other or none	1%	—	—	—
COOLING SYSTEM				
Central	60%	79%	64%	68%
Room unit	30%	12%	29%	18%

Fort Worth

Like electric utilities in other Texas cities, the Texas Electric Service Co. is offering cash rebates to its residential customers who buy more efficient air conditioners and heat pumps.

The program, designed to reduce the utility's summer peak load by 200,000 kW (about 5%) by 1985, also includes a rebate for systems that use compressor waste heat for water heating purposes.

This program, now one year old, is just beginning to take hold, the utility reports. A comparable energy conservation program for the commercial-industrial sector was announced last month.

With new home building flat, replacement sales will have to carry the market here in 1982, according to Berkley Reagan of Thermal Supply, a distributor.

"Nobody has built up the volume they want for the new residential market, and my own new residential volume is down about 75%," he says.

Heat pumps are found in about 5% of single-family, owner-occupied homes, and their presence is expected to grow during the 1980's.

A mature air conditioning market, Fort Worth's housing stock is about 90% air conditioned, and about two-thirds of it is centrally air conditioned, according to Census figures.

The city's housing inventory grew by 12% during the 1970's, to 155,000 units. The Dallas-Fort Worth area itself grew by 45% during the period, to nearly 1.2 million homes.

Age of heating system, single-family, owner occupied

192,400 units

Years old	% of total
0 to 3	22%
4 to 10	24%
11 to 20	26%
21 to 40	7%
41-plus	—
No response	21%

Average shipments to area

(Combined with Dallas)

Furnaces	**40,000**
Heat pumps	**10,000**
Central air conditioners	**80,000**
Humidifiers	**5,000**
Vent dampers	**1,000**

SATURATION PATTERNS

322,000 housing units

	Single family 250,000	Multi family 72,000	Owner occupied 193,000	Renter occupied 129,000
FUEL USE				
Utility gas	71%	53%	68%	64%
Bottled or LP gas	3%	—	3%	1%
Fuel oil	—	—	29%	35%
Electricity	—	2%	—	—
Other or none	—	—	—	—
HEATING SYSTEM				
Warm air furnace	63%	72%	71%	53%
Steam or hot water	—	—	—	—
Built-in electric units	—	—	9%	—
Floor, wall, pipeless furnaces	10%	11%	16%	13%
Room heaters	26%	16%	3%	31%
Fireplaces, stoves, portable heaters	1%	—	2%	2%
Other or none	—	1%	—	1%
COOLING SYSTEM				
Central	55%	71%	64%	50%
Room unit	34%	15%	27%	38%

Greensboro

In Greensboro, heat pumps are extremely popular as both a new house component and as a replacement for central air conditioning, according to Census figures and to studies made by the Duke Power Co.

Saturation of heat pumps is now at 7% for single-family homes, and their presence is expected to grow at the expense of both warm air furnaces and straight central air conditioning systems.

The Greensboro-Winston-Salem area added 84,000 new housing units to its inventory during the past decade, a gain of 36%. Most of these units were centrally air conditioned, raising total saturation of cooled housing to about 60%, of which slightly more than half is accounted for by room units.

Fuel oil "took a bad beating during the oil embargo," according to Larry Somers, of Loman-Garrett, distributors. "But oil is making something of a comeback, but nothing like what it was prior to 1974."

He sees stiffened consumer resistance to replacements, a trend that follows directly on the new housing nosedive. "We had thought that replacement systems might cushion the blow, but in this area, homeowners aren't hurrying to replace their furnaces or air conditioners," he says.

Age of heating system, single-family, owner occupied

183,000 units

Years old	% of total
0 to 3	23%
4 to 10	22%
11 to 20	33%
21 to 40	12%
41-plus	1%
No response	9%

Average shipments to area

Furnaces	3,000
Heat pumps	5,000
Central air conditioners	9,000
Humidifiers	1,000
Vent dampers	500

SATURATION PATTERNS

259,000 housing units

	Single family 213,000	Multi family 46,000	Owner occupied 170,000	Renter occupied 89,000
FUEL USE				
Utility gas	23%	34%	19%	39%
Bottled or LP gas	3%	4%	3%	2%
Fuel oil	40%	13%	42%	18%
Electricity	27%	49%	30%	35%
Other or none	7%	—	6%	6%
HEATING SYSTEM				
Warm air furnace	56%	63%	59%	55%
Steam or hot water	5%	—	5%	—
Built-in electric units	19%	20%	19%	13%
Floor, wall, pipeless furnaces	7%	12%	7%	2%
Room heaters	8%	2%	8%	26%
Fireplaces, stoves, portable heaters	1%	3%	2%	2%
Other or none	4%	3%	2%	2%
COOLING SYSTEM				
Central	30%	51%	30%	30%
Room unit	37%	15%	38%	20%

Houston

Houston will see a general increase in the efficiency of air conditioners and heat pumps this year, prompted by a generous rebate program put into effect this January by Houston Lighting & Power Co.

A direct rebate of $150 per ton for heat pumps will go to the homeowner for any unit with a minimum seasonal energy efficiency ratio (SEER) of 8.0 or higher. Window units in that efficiency range will yield $100 per ton.

For straight air conditioning, the utility will offer a $50 per ton rebate. In addition, a $25 rebate will go to the dealer.

As explained by Don Bulla, who designed the rebate program, "We expect to see a 1.5 SEER increase in installed air conditioning this year; that's good for 40 megawatts a year in our system."

The aggressive heat pump promotion will increase its share of the total central air conditioning market from the present 10% to between 17% and 20% by the end of 1982, Bulla believes.

In a typical year, that would mean about 20,000 heat pumps absorbed into the dynamic Houston residential market – including both replacement and first-installation .

The area's apartments are bulging, with a 97% occupancy rate; many of these are young people, potential homebuyers who must await a drop in the interest rates before they qualify for mortgages.

Age of heating system, single-family, owner occupied

473,000 units

Years old	% of total
0 to 3	18%
4 to 10	24%
11 to 20	21%
21 to 40	7%
41-plus	—
No response	30%

Average shipments to area

Furnaces	45,000
Heat pumps	6,000
Central air conditioners	90,000
Humidifiers	5,000

SATURATION PATTERNS

861,000 housing units

	Single family 606,000	Multi family 255,000	Owner occupied 456,000	Renter occupied 405,000
FUEL USE				
Utility gas	74%	34%	70%	52%
Bottled or LP gas	7%	—	7%	1%
Fuel oil	—	—	—	—
Electricity	17%	63%	20%	45%
Other or none	2%	3%	3%	2%
HEATING SYSTEM				
Warm air furnace	61%	82%	71%	65%
Steam or hot water	—	—	—	—
Built-in electric units	17%	2%	3%	2%
Floor, wall, pipeless furnaces	5%	3%	4%	5%
Room heaters	12%	10%	22%	22%
Fireplaces, stoves, portable heaters	5%	1%	—	5%
Other or none	—	2%	—	1%
COOLING SYSTEM				
Central	52%	72%	62%	60%
Room unit	31%	9%	28%	21%

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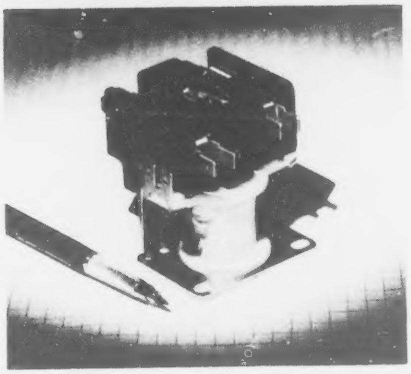

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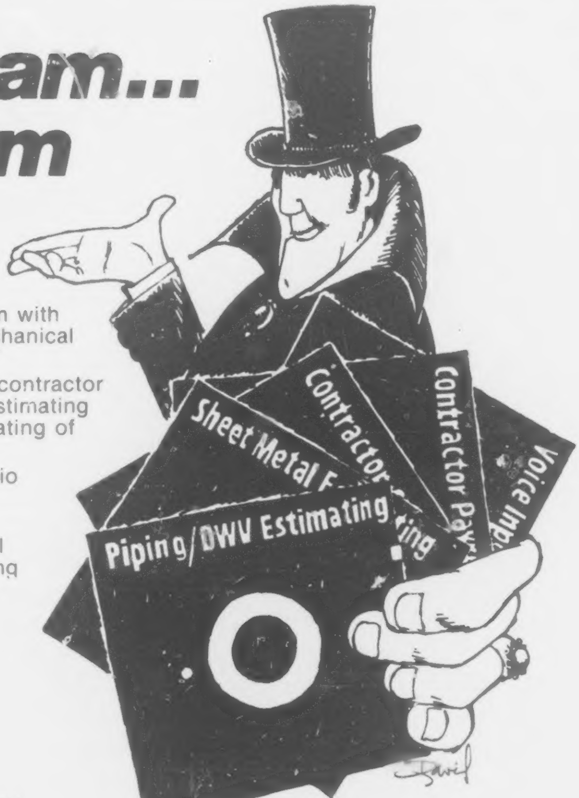

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Louisville

Following an infusion of electric heat pumps into this market in the 1970's, the availability of gas has slowed down this product. In addition, the local utility sells both gas and electricity, and has assumed a neutral stance about either fuel.

"It wouldn't behoove anybody to install a heat pump if he has gas mains, since gas is running about 33.3 cents per therm," says a utility executive. "But deregulation of gas is like a sword over our heads, and heat pumps may become attractive here again in the next few years."

Many homes built with heat pumps in the past eight years have converted to gas, as it became available, with the pumps retained as an add-on feature. "Nobody's actually torn out a heat pump to make room for a gas furnace, but we know that we've added mains to areas where heat pumps were already in place," says the official.

Jack Schoch, whose distributing firm carries his name, says that other than some "emergency" repairs and replacements, the change-out market for furnaces has been flat. "People are sitting around and waiting, holding onto what they've got, trying to squeeze the last bit of performance out of their heating systems," he says.

"Anybody replacing a central air conditioner ought to put in a heat pump because it's economically feasible for the first time," says the local General Electric distributor.

Age of heating system, single-family, owner occupied

218,000 units

Years old	% of total
0 to 3	16%
4 to 10	25%
11 to 20	41%
21 to 40	12%
41-plus	1%
No response	5%

Average shipments to area

Furnaces	**7,000**
Heat pumps	**7,000**
Central air conditioners	**12,000**
Humidifiers	**4,000**
Vent dampers	**2,000**

SATURATION PATTERNS

319,000 housing units

	Single family 244,000	Multi family 75,000	Owner occupied 204,000	Renter occupied 115,000
FUEL USE				
Utility gas	78%	75%	77%	84%
Bottled or LP gas	3%	—	4%	—
Fuel oil	5%	5%	5%	5%
Electricity	13%	13%	14%	11%
Other or none	1%	—	—	—
HEATING SYSTEM				
Warm air furnace	86%	74%	92%	68%
Steam or hot water	—	13%	—	10%
Built-in electric units	1%	2%	1%	2%
Floor, wall, pipeless furnaces	5%	5%	2%	10%
Room heaters	5%	4%	3%	10%
Fireplaces, stoves, portable heaters	—	2%	2%	—
Other or none	3%	—	—	—
COOLING SYSTEM				
Central	55%	42%	54%	30%
Room unit	23%	34%	25%	40%

Miami

Will a utility rebate of $400 be enough to motivate homeowners to replace existing cooling systems with high efficiency units?

Florida Power & Light Company has embarked on such a rebate program, and while early responses have been "encouraging," utility officials do not yet have definitive evidence that it will work. In fact, the utility is still trying to work out the details of how an infusion of high efficiency air conditioning systems and heat pumps would affect their total load.

Like other utilities around the country, it needs to know the efficiencies of equipment now on its lines, and the extent to which improvements in the building envelope and in the mechanical systems (or a mix of both) would reduce consumption.

One contractor, Herb Gold, is skeptical about the effectiveness of the rebate program. "Everybody wants to go to heaven, but nobody wants to die," he says.

Utility surveys show a replacement of about 8,800 straight air conditioning systems and 3,700 heat pumps this year.

Age of heating system, single-family, owner occupied

219,000 units

Years old	% of total
0 to 3	18%
4 to 10	30%
11 to 20	13%
21 to 40	1%
41-plus	—
No response	38%

Average shipments to area

Furnaces	2,000
Heat pumps	6,000
Central air conditioners	50,000
Humidifiers	1,000

SATURATION PATTERNS

577,000 housing units

	Single family 286,000	Multi family 291,000	Owner occupied 294,000	Renter occupied 283,000
FUEL USE				
Utility gas	15%	6%	17%	6%
Bottled or LP gas	10%	1%	8%	3%
Fuel oil	—	1%	—	1%
Electricity	61%	74%	67%	69%
Other or none	14%	16%	8%	21%
HEATING SYSTEM				
Warm air furnace	35%	55%	41%	46%
Steam or hot water	—	1%	—	1%
Built-in electric units	16%	18%	15%	18%
Floor, wall, pipeless furnaces	6%	—	4%	2%
Room heaters	14%	16%	15%	8%
Fireplaces, stoves, portable heaters	15%	8%	14%	7%
Other or none	14%	2%	11%	18%
COOLING SYSTEM				
Central	35%	46%	45%	36%
Room unit	54%	38%	47%	45%

New Orleans

New Orleans, reflecting the national pattern, now finds about 50% of its air conditioning sales in the replacement and add-on market.

Given the area's long experience with central air conditioning, the replacement market is considerable – an inventory of about 500,000 housing units, involving upwards of 30,000 replacements annually.

Capturing this market are a relative handful of aggressive dealers. "The 80/20 split holds true here, with 80% of the business going to the top 20% of the dealers," says Fred Mirambell, of Lee Lightner Distributing Co.

"We've seen customer acceptance of high efficiency air conditioners grow right along with the increases in electric rates," he says. Efficiencies are in the 8 to 9 seasonal energy efficiency ratio (SEER) range.

With the changeout of a condenser, the serviceman can usually sell up a coil change "for a few hundred dollars more," and possibly run some new tubing to accommodate the large coil sizes on the higher efficiency units.

Heat pumps, while gaining acceptance as a new housing component, still meet consumer resistance because of gas availability. New Orleans Public Service Co., which sells both major fuels, has left fuel choice largely up to the consumer.

Age of heating system, single-family, owner occupied

195,600 units

Years old	% of total
0 to 3	18%
4 to 10	29%
11 to 20	31%
21 to 40	14%
41-plus	—
No response	8%

Average shipments to area

Furnaces	15,000
Heat pumps	3,000
Central air conditioners	30,000
Humidifiers	1,000

SATURATION PATTERNS

374,000 housing units

	Single family 226,000	Multi family 148,000	Owner occupied 209,000	Renter occupied 165,000
FUEL USE				
Utility gas	89%	73%	90%	75%
Bottled or LP gas	2%	—	2%	—
Fuel oil	—	—	—	—
Electricity	8%	25%	8%	24%
Other or none	1%	2%	—	1%
HEATING SYSTEM				
Warm air furnace	67%	32%	72%	28%
Steam or hot water	—	2%	—	2%
Built-in electric units	1%	5%	1%	4%
Floor, wall, pipeless furnaces	20%	21%	18%	25%
Room heaters	11%	34%	2%	36%
Fireplaces, stoves, portable heaters	1%	4%	7%	5%
Other or none	—	2%	—	—
COOLING SYSTEM				
Central	52%	24%	56%	22%
Room unit	40%	53%	41%	51%

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Norfolk

Norfolk's economic base is an enviably diverse one, including shipbuilding, coal exporting, and defense industries, as well as a potent tourist industry.

This translates into a housing market that has been less damaged than those in most other areas.

Frank Smith, secretary of the Tidewater Home Building Assn., looks for a 4,300-unit year; this would be even with 1981, and down about 20% from building levels attained during the 1970's.

Equipment distributor Tom Atkinson of Allied Heating & Air Conditioning Sales notes that Norfolk is prime heat pump territory. "Even the local fuel oil dealers have gotten religion," he says. "They've done a 180-degree turn. Earlier, they fought the heat pumps; now they see the pump as a way to keep their home heating customers, and it also gives them another dimension to their service contracts."

In all, the area now has more than 35,000 heat pumps installed, according to Bill Woolard of Booth Supply Co. Inc. In many cases they are a builder item as a straight heat pump, with no fossil fuel backup.

The area added about 65,000 new units to its housing inventory during the 1970's, and the replacement market for heating and cooling systems has grown. Over 40% of its home heating systems are now old enough to be replaced.

Age of heating system, single-family, owner occupied

129,000 units

Years old	% of total
0 to 3	25%
4 to 10	35%
11 to 20	30%
21 to 40	7%
41-plus	3%
No response	—

Average shipments to area

Furnaces	4,000
Heat pumps	5,000
Central air conditioners	6,000
Humidifiers	1,000
Vent dampers	1,000

SATURATION PATTERNS

257,000 housing units

	Single family	Multi family	Owner occupied	Renter occupied
	170,000	87,000	133,000	124,000
FUEL USE				
Utility gas	38%	41%	36%	42%
Bottled or LP gas	—	—	—	—
Fuel oil	34%	24%	34%	27%
Electricity	24%	33%	30%	28%
Other or none	4%	2%	—	3%
HEATING SYSTEM				
Warm air furnace	52%	21%	59%	25%
Steam or hot water	13%	25%	15%	18%
Built-in electric units	14%	26%	12%	23%
Floor, wall, pipeless furnaces	11%	8%	8%	13%
Room heaters	7%	16%	4%	17%
Fireplaces, stoves, portable heaters	1%	2%	—	2%
Other or none	2%	2%	2%	2%
COOLING SYSTEM				
Central	38%	30%	41%	23%
Room unit	42%	31%	40%	34%

Tampa

The heat pump program developed by the Tampa Electric Co. last year is beginning to yield results.

It has accounted for about 3,000 high-efficiency heat pumps being installed, replacing straight cooling. Also, heat pumps are now being installed in about 70% of new homes, compared with 5% last year.

It should be noted, though, that new construction is down sharply here. New house completions are off 20%, permits are down 35%, and there is no relief in sight.

Heat pump penetration in apartment buildings is picking up, according to Jerry Kordecki of the utility. "A number of builders are willing to go the next $100 to $150 additional first cost for the pumps," he says.

The emphasis on high-efficiency, energy-conserving appliances is serious in south Florida, given the profile of its housing and population. In the Tampa area, the use of electricity as a heating source has reached nearly 60%, with a corresponding decline in oil and gas.

Winter peaks, driven by residential electric heating loads, have forced utilities into an aggressive energy conservation posture; also a state building code encourages the use of high-efficiency climate control systems.

Age of heating system, single-family, owner occupied

327,000 units

Years old	% of total
0 to 3	18%
4 to 10	31%
11 to 20	30%
21 to 40	11%
41-plus	—
No response	10%

Average shipments to area

Furnaces	4,000
Heat pumps	11,000
Central air conditioners	40,000
Humidifiers	1,000

SATURATION PATTERNS

495,000 housing units

	Single family 374,000	Multi family 121,000	Owner occupied 321,000	Renter occupied 174,000
FUEL USE				
Utility gas	9%	10%	10%	10%
Bottled or LP gas	10%	—	7%	—
Fuel oil	34%	13%	34%	7%
Electricity	45%	30%	47%	60%
Other or none	2%	47%	2%	6%
HEATING SYSTEM				
Warm air furnace	47%	44%	55%	54%
Steam or hot water	—	5%	—	3%
Built-in electric units	11%	10%	12%	10%
Floor, wall, pipeless furnaces	6%	4%	6%	4%
Room heaters	28%	15%	25%	24%
Fireplaces, stoves, portable heaters	3%	5%	2%	3%
Other or none	5%	17%	—	2%
COOLING SYSTEM				
Central	46%	64%	49%	37%
Room unit	38%	20%	55%	28%

Washington, D.C.

Washington, D.C., remains one of the largest laboratories for the wide scale use of residential electric heat pumps in the country.

An appliance saturation report from the Potomac Electric Power Co. (PEPCO) reflects the dramatic growth of heat pumps from a standing start in 1974, with less than 1% saturation, to 1980, with a 6.1% penetration. This represents more than 27,000 heat pumps in the District, as well as in outlying Montgomery and Prince Georges Counties.

In a further breakdown, PEPCO reports that in the 1978-80 period alone, it added 7,160 heat pumps in single-family homes and townhouses, and 3,413 units in apartments, for a total of 10,573 – about one-third of the total installations put in place in the two-year period.

The Washington metropolitan area is a mature central air conditioning market. PEPCO studies show that about 59% of central systems were installed before 1973. That's a potential replacement market of about 141,000 systems.

Home heating systems show the same aging pattern. Only 44% of the systems were installed since 1967; the balance are now 15 years old or more.

The growth of central cooling is reflected in the gradual decline of room units, which are now at 31% saturation, compared with 45% saturation in 1974.

The area also includes about 35,000 natural gas central air conditioning systems, or about 8% of the utility's residential customers.

Age of heating system, single-family, owner occupied

497,000 units

Years old	% of total
0 to 3	16%
4 to 10	26%
11 to 20	28%
21 to 40	23%
41-plus	2%
No response	5%

Average shipments to area

Furnaces	**12,000**
Heat pumps	**20,000**
Central air conditioners	**45,000**
Humidifiers	**15,000**
Boilers	**2,000**
Vent dampers	**8,000**

SATURATION PATTERNS

1,048,000 housing units

	Single family 604,000	Multi family 444,000	Owner occupied 555,000	Renter occupied 493,000
FUEL USE				
Utility gas	63%	48%	62%	51%
Bottled or LP gas	1%	—	1%	—
Fuel oil	20%	37%	18%	37%
Electricity	15%	14%	17%	11%
Other or none	1%	1%	2%	1%
HEATING SYSTEM				
Warm air furnace	73%	55%	75%	56%
Steam or hot water	20%	41%	18%	40%
Built-in electric units	3%	2%	3%	3%
Floor, wall, pipeless furnaces	1%	2%	1%	—
Room heaters	2%	—	2%	1%
Fireplaces, stoves, portable heaters	—	—	—	—
Other or none	1%	2%	1%	—
COOLING SYSTEM				
Central	59%	61%	65%	53%
Room unit	26%	19%	24%	22%

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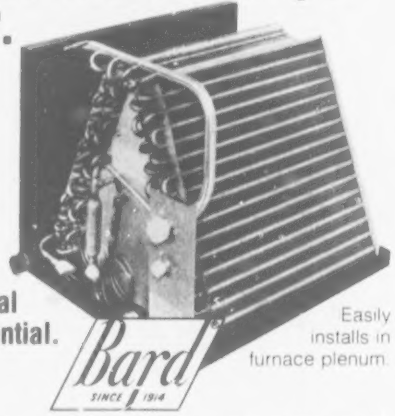

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In the aggregate, the housing inventory of the 13 western states is still relatively young. About 40% of its housing stock has been built since 1970, and in cities like Phoenix and Las Vegas the homes are so new that there is virtually no replacement activity.

New housing construction has fallen off drastically here. California, which averaged 225,000 new housing units during the 1970's, has been particularly hard hit.

Now in its embryo stage is the National Housing Crisis Council, conceived by the chairman of the Wickes Cos., a building products company based in San Diego. Its objective: government aid to the depressed housing industry. One building products official said the national housing situation "is close to disaster."

SATURATION PATTERNS

14,950,000 housing units

	Single family 9,780,000	Multi family 5,170,000	Owner occupied 9,091,000	Renter occupied 5,859,000
FUEL USE				
Utility gas	72%	60%	70%	63%
Bottled or LP gas	2%	1%	3%	2%
Fuel oil	6%	3%	6%	4%
Electricity	16%	29%	17%	25%
Other or none	4%	7%	4%	7%
HEATING SYSTEM				
Warm air furnace	58%	63%	65%	29%
Steam or hot water	2%	7%	2%	7%
Built-in electric units	8%	20%	8%	18%
Floor, wall, pipeless furnaces	21%	4%	16%	31%
Room heaters	5%	3%	4%	9%
Fireplaces, stoves, portable heaters	4%	2%	2%	2%
Other or none	2%	1%	3%	4%
COOLING SYSTEM				
Central	18%	19%	23%	11%
Room unit	12%	17%	12%	15%

Denver

The greater Denver area ended 1981 down 27% in building permits for multifamily residential buildings, and up nearly 1% in single-family (including condos and townhouses).

Long waits for gas hookups and expensive permits required for water taps are two constraints on new building activity, as is the lack of mortgage money and high interest rates, according to Gene Bohner, of the Denver homebuilder's association.

Much of the area's homebuilding activity is fueled by the location of energy corporation headquarters into Denver, close to the boom in nearby Wyoming. Commercial building has been strong here; however, the unemployment rate in the residential building industry is about 20%.

"It's all going to break loose in the second quarter of 1982, or we're all going to lose our shirts."

Residential air conditioning remains relatively modest here, with a short cooling season and relatively modest electric bills.

Denver, served by a utility that sells both gas and electric service, is very barren heat pump territory; Public Service Company of Colorado does not promote them. Utility executives point to a 3-1 price differential in favor of gas over electricity.

Even if that differential shrinks with deregulation of natural gas, it will remain the preferred fuel.

Age of heating system, single-family, owner occupied

373,100 units

Years old	% of total
0 to 3	14%
4 to 10	30%
11 to 20	30%
21 to 40	18%
41-plus	3%
No response	5%

Average shipments to area

Furnaces	25,000
Heat pumps	2,000
Central air conditioners	10,000
Humidifiers	4,000
Boilers	1,000
Vent dampers	1,000

SATURATION PATTERNS

579,000 housing units

	Single family 420,000	Multi family 159,000	Owner occupied 376,000	Renter occupied 203,000
FUEL USE				
Utility gas	95%	88%	94%	90%
Bottled or LP gas	—	1%	1%	1%
Fuel oil	1%	6%	—	5%
Electricity	4%	5%	4%	3%
Other or none	—	—	1%	1%
HEATING SYSTEM				
Warm air furnace	87%	39%	88%	46%
Steam or hot water	8%	52%	9%	45%
Built-in electric units	2%	2%	1%	2%
Floor, wall, pipeless furnaces	1%	5%	1%	5%
Room heaters	1%	1%	1%	2%
Fireplaces, stoves, portable heaters	—	—	—	—
Other or none	1%	1%	—	—
COOLING SYSTEM				
Central	20%	34%	22%	13%
Room unit	29%	39%	30%	19%

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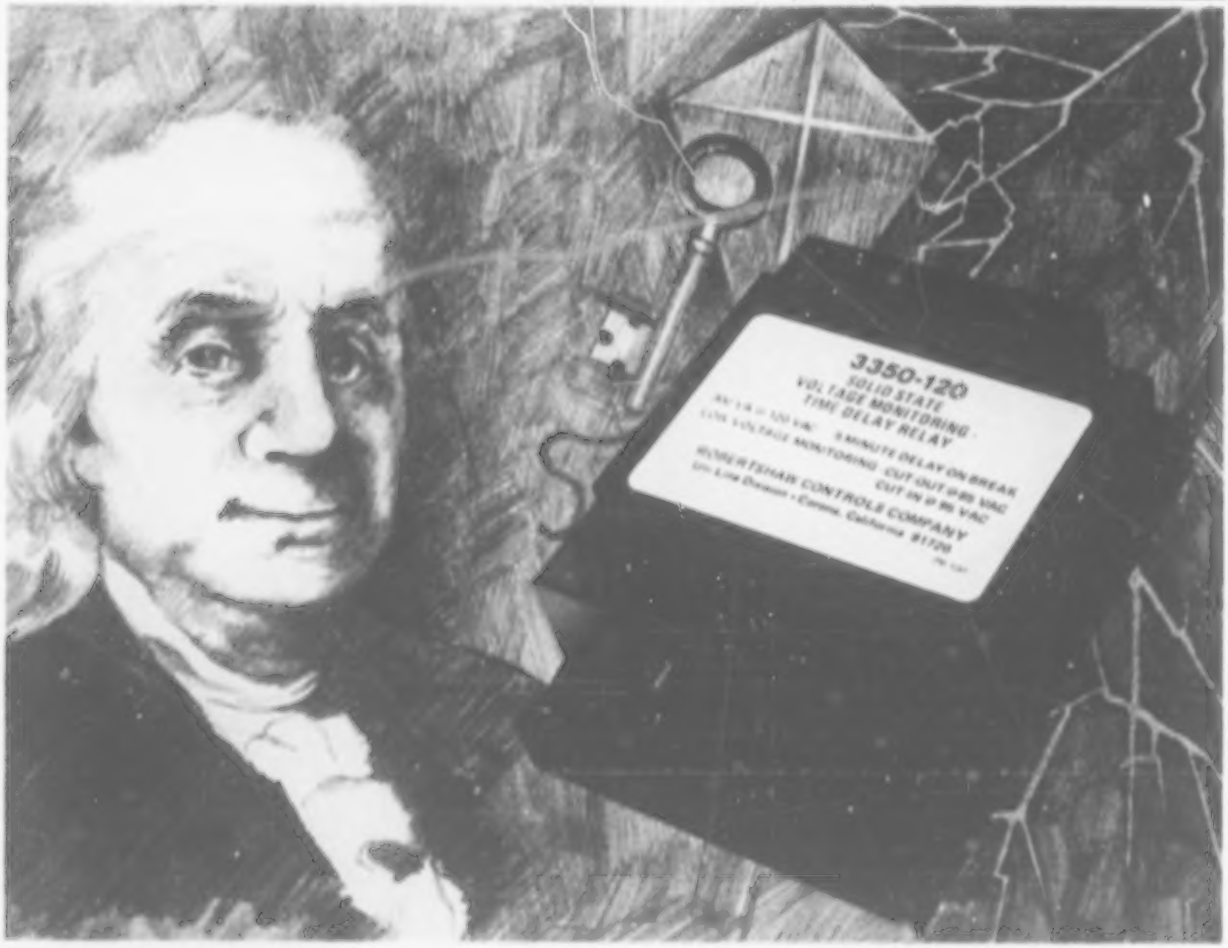
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Los Angeles

The Los Angeles area, because of its enormous size, annually absorbs a tremendous amount of heating-cooling equipment, but it remains, paradoxically, a relatively untapped total market for central air conditioning.

For example, Census data indicate that about 300,000 housing units in the top income brackets remain uncooled, either by room units or central systems. Even the very top income bracket represents about 100,000 homes with no air conditioning.

Data from the Los Angeles Department of Water and Power show single-family cooling at 8% saturation, and multi-family units at 5%. Window units are found in about 30% of homes served by the utility, whose boundaries are contiguous with the city itself.

Evaporative coolers are found in about 7% of the approximately 1 million homes in the utility's service area.

However, outlying areas served by Southern California Edison Co., show a higher incidence of cooling. The utility's Central Divison shows a 27% central cooling saturation, of which about 3% are heat pumps. Likewise, evaporative coolers are found in 12% of homes in this division.

Age of heating system, single-family, owner occupied

1,250,000 units

Years old	% of total
0 to 3	12%
4 to 10	13%
11 to 20	24%
21 to 40	36%
41-plus	5%
No response	10%

Average shipments to area

Furnaces	70,000
Heat pumps	9,000
Central air conditioners	60,000
Humidifiers	5,000

SATURATION PATTERNS

2,693,000 housing units

	Single family 1,628,000	Multi family 1,065,000	Owner occupied 1,292,000	Renter occupied 1,401,000
FUEL USE				
Utility gas	95%	77%	96%	80%
Bottled or LP gas	—	—	—	—
Fuel oil	—	—	—	—
Electricity	3%	20%	3%	15%
Other or none	2%	3%	1%	5%
HEATING SYSTEM				
Warm air furnace	41%	19%	48%	16%
Steam or hot water	—	—	—	—
Built-in electric units	1%	16%	2%	12%
Floor, wall, pipeless furnaces	52%	50%	45%	57%
Room heaters	5%	11%	3%	10%
Fireplaces, stoves, portable heaters	—	2%	1%	1%
Other or none	1%	2%	1%	4%
COOLING SYSTEM				
Central	18%	10%	23%	8%
Room unit	21%	25%	20%	24%

Oklahoma City

Oklahoma City is enjoying the kind of prosperity that much of the nation has seen slip away in the past several years.

Its booming oil industry has kept the local economy very much alive, even though outlying agricultural counties are feeling the pinch.

The state has a $500 million surplus, unemployment is at about 5% (it was 3% as recently as last fall) and oil wells are being drilled at a record pace.

Oklahoma Gas and Electric Co. has just started a unique cash rebate program to homeowners who reduce electric consumption, by whatever means. The program has already paid $580 to one homeowner who insulated her leaky home.

Homebuilding executive Clark Trammell sees building permits in the range of 4,400 single-family homes and about 1,000 for multifamily units, "although we could handle three times that many units."

Pent up demand for housing in Oklahoma City is very strong. There are virtually no unsold new homes in inventory.

"Interest rates are moving sideways right now," Trammell says, "and that's the controlling factor on who buys new homes."

Age of heating system, single-family, owner occupied

180,000 units

Years old	% of total
0 to 3	24%
4 to 10	24%
11 to 20	34%
21 to 40	6%
41-plus	2%
No response	12%

Average shipments to area

Furnaces	**9,000**
Heat pumps	**3,000**
Central air conditioners	**24,000**
Humidifiers	**3,000**
Vent dampers	**2,000**

SATURATION PATTERNS

269,000 housing units

	Single family 217,000	Multi family 52,000	Owner occupied 172,000	Renter occupied 97,000
FUEL USE				
Utility gas	89%	42%	86%	54%
Bottled or LP gas	2%	—	2%	—
Fuel oil	—	—	—	—
Electricity	9%	58%	12%	46%
Other or none	—	—	—	—
HEATING SYSTEM				
Warm air furnace	63%	52%	67%	51%
Steam or hot water	—	—	—	—
Built-in electric units	—	32%	—	17%
Floor, wall, pipeless furnaces	26%	6%	24%	20%
Room heaters	10%	10%	8%	12%
Fireplaces, stoves, portable heaters	1%	—	1%	—
Other or none	—	—	—	—
COOLING SYSTEM				
Central	52%	55%	54%	44%
Room unit	36%	22%	32%	37%

Phoenix

Like Houston and Dallas, Phoenix is now undergoing an ambitious electric utility promotion that rewards, via cash rebates and discounts, the installation of high-efficiency central air conditioners.

In Phoenix, the Arizona Public Service Co. began on January 1 an energy control credit program that offers rebates to homeowners for replacement or first installation of high-efficiency units.

Five tiers of rebates start at $20 per ton for units in the 7 to 7.5 energy efficiency ratio (EER) range, and up to $100 per ton for units in the 10.6 and higher range.

Also, the utility is offering $45 per ton for any home that installs a pre-cooling device, and will provide a billing credit of $20 per ton for any replacement compressor that includes a high-efficiency motor.

"We're looking at between 18,000 and 22,000 central cooling replacements a year in Phoenix," says Tom Morron, who runs the utility's energy conservation program. "We've had this on the drawing board for four years, and now we have gotten the green light to put it into effect."

Another utility serving parts of the Phoenix market is the Salt River Project, which is going to experiment with an ice storage system to complement its time-of-day electric rates, which discourage daytime, peak period electric use.

Age of heating system, single-family, owner occupied

349,000 units

Years old	% of total
0 to 3	17%
4 to 10	42%
11 to 20	22%
21 to 40	6%
41-plus	1%
No response	13%

Average shipments to area

Furnaces	**4,000**
Heat pumps	**25,000**
Central air conditioners	**35,000**
Humidifiers	**1,000**

SATURATION PATTERNS

526,000 housing units

	Single family 408,000	Multi family 118,000	Owner occupied 331,000	Renter occupied 195,000
FUEL USE				
Utility gas	49%	39%	45%	53%
Bottled or LP gas	9%	—	10%	1%
Fuel oil	—	2%	—	—
Electricity	37%	59%	40%	44%
Other or none	5%	—	5%	2%
HEATING SYSTEM				
Warm air furnace	80%	80%	83%	71%
Steam or hot water	—	3%	—	2%
Built-in electric units	2%	7%	3%	5%
Floor, wall, pipeless furnaces	10%	7%	6%	14%
Room heaters	2%	2%	2%	5%
Fireplaces, stoves, portable heaters	1%	1%	1%	1%
Other or none	5%	—	5%	2%
COOLING SYSTEM				
Central	65%	72%	70%	62%
Room unit	3%	8%	5%	6%

Portland

A new residential electric rate structure rewards low-volume energy users and penalizes excessive energy use, with an "inverted" rate plan. Rates going into effect last October cut customer costs an average of 27%.

The two large utilities – Pacific Power & Light Co. and Portland General Electric Co. – now have a "tiered" rate structure under which the first blocks of electric power are low priced, but escalate beyond the first 1,300 kWh in the summer.

Recent state legislation requires oil heating distributors to perform audits for oil heated homes, and to establish a loan fund for homeowners who want to weatherize their homes.

Portland itself has fully weatherized more than 18,000 homes. The city was one of the pioneers in developing a home audit program.

The Portland area continues to increase its absorption of electric heat pumps, which now represent more than 55% of all unitary equipment shipped into the area. More than 75% of new homes now have them as a standard system.

Given its high electric use, the area is also a prime candidate for heat pump water heaters, about 250 of which have now been installed in the service area of Portland General Electric.

Initial performance of monitored units shows an average savings in energy of 45% – a remarkable performance.

Age of heating system, single-family, owner occupied

275,000 units

Years old	% of total
0 to 3	13%
4 to 10	25%
11 to 20	32%
21 to 40	18%
41-plus	3%
No response	9%

Average shipments to area

Furnaces	**8,000**
Heat pumps	**7,000**
Central air conditioners	**8,000**
Humidifiers	**2,000**
Vent dampers	**1,000**

SATURATION PATTERNS

511,000 housing units

	Single family 334,000	Multi family 177,000	Owner occupied 270,000	Renter occupied 241,000
FUEL USE				
Utility gas	26%	16%	30%	18%
Bottled or LP gas	—	—	—	—
Fuel oil	35%	17%	35%	22%
Electricity	36%	49%	35%	49%
Other or none	3%	18%	—	11%
HEATING SYSTEM				
Warm air furnace	35%	10%	69%	17%
Steam or hot water	—	39%	—	28%
Built-in electric units	25%	47%	23%	45%
Floor, wall, pipeless furnaces	1%	1%	1%	2%
Room heaters	4%	2%	2%	3%
Fireplaces, stoves, portable heaters	5%	—	2%	3%
Other or none	—	—	—	—
COOLING SYSTEM				
Central	7%	4%	8%	3%
Room unit	12%	5%	13%	8%

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San Bernardino

Seventy miles east of Los Angeles, San Bernardino presents a different air conditioning profile than the megalopolis to the west.

Central air conditioning saturation is over 40% here, as confirmed by both Census data and studies made by the Southern California Edison Co.

In addition, the San Bernardino area is also prime territory for the evaporative cooler. Utility studies show that it is found in about 5% of homes, although this estimate may be too conservative, according to John Williams, branch manager of Desert Service, a local distributor.

"We figure that evaporative coolers are going in at about a 3-1 ratio over straight central air conditioning," he says. "This represents a complete cycle, because up until a few years ago, the coolers were extremely popular, then they went into a decline. Then came the energy crunch a few years ago, and they've had a very big resurgence."

Utility promotions urging homeowners not to use their central air conditioners any more than necessary have had an impact on their sales, he believes.

The region has a fairly constant 20% relative humidity year around, although humidity levels may be gradually increasing here because of population shifts and their effect on the environment.

Age of heating system, single-family, owner occupied

335,000 units

Years old	% of total
0 to 3	19%
4 to 10	27%
11 to 20	28%
21 to 40	17%
41-plus	—
No response	9%

Average shipments to area

Furnaces	**10,000**
Heat pumps	**1,000**
Central air conditioners	**18,000**
Humidifiers	**1,000**

SATURATION PATTERNS

506,000 housing units

	Single family 427,000	Multi family 79,000	Owner occupied 278,000	Renter occupied 228,000
FUEL USE				
Utility gas	85%	66%	82%	70%
Bottled or LP gas	2%	—	1%	1%
Fuel oil	1%	—	1%	—
Electricity	12%	34%	16%	29%
Other or none	—	—	—	—
HEATING SYSTEM				
Warm air furnace	65%	55%	70%	83%
Steam or hot water	—	—	—	—
Built-in electric units	4%	8%	3%	—
Floor, wall, pipeless furnaces	25%	33%	22%	17%
Room heaters	3%	3%	3%	—
Fireplaces, stoves, portable heaters	2%	1%	—	—
Other or none	1%	—	—	—
COOLING SYSTEM				
Central	42%	48%	41%	42%
Room unit	28%	34%	27%	38%

San Diego

Is there trouble in Paradise?

Astronomical electric bills – among the highest in the country – combined with the general economic downturn have soured the residential heating-cooling market in this city, which is usually considered one of the most desirable locations in the country.

This is a market whose climate has never required great outlays of energy to heat and cool homes, and wholesalers have noted a sharp decline in this part of their business.

"I've never seen so many write-offs of bad debts," says Fred Clarke, general manager of Reliable Steel Supply Co., a local distributor.

"We're seeing a high percentage of small business bankrupcies, and in talking with other wholesalers we find a general pattern of subcontractors who have extended themselves. Naturally, profits are depressed."

Recent public utility commission rate hearings have resembled war zones, with San Diego Gas and Electric Co. officials eligible for hazardous-duty pay.

Something of a milestone was reached here when a homeowner complained of a $2,400 electric bill for her 2,400 sq. ft. all-electric home. She brought the bill to the commission, which investigated and found the bill valid.

Age of heating system, single-family, owner occupied

373,000 units

Years old	% of total
0 to 3	23%
4 to 10	23%
11 to 20	22%
21 to 40	24%
41-plus	1%
No response	7%

Average shipments to area

Furnaces	17,000
Heat pumps	4,000
Central air conditioners	15,000
Humidifiers	1,000

SATURATION PATTERNS

687,000 housing units

	Single family 441,000	Multi family 236,000	Owner occupied 384,000	Renter occupied 303,000
FUEL USE				
Utility gas	89%	61%	87%	68%
Bottled or LP gas	4%	—	4%	—
Fuel oil	—	—	2%	—
Electricity	5%	37%	7%	29%
Other or none	2%	2%	—	3%
HEATING SYSTEM				
Warm air furnace	63%	21%	67%	23%
Steam or hot water	—	—	—	—
Built-in electric units	28%	31%	5%	23%
Floor, wall, pipeless furnaces	3%	38%	23%	43%
Room heaters	2%	9%	1%	8%
Fireplaces, stoves, portable heaters	2%	—	2%	—
Other or none	2%	1%	2%	3%
COOLING SYSTEM				
Central	14%	6%	15%	6%
Room unit	8%	07%	9%	7%

San Francisco

The 48 northern and central counties served by Pacific Gas and Electric Co. present a mixed pattern of fuel use for heating and air conditioning.

A few highlights of the utility's excellent appliance saturation report taken two years ago show:

* Central cooling is found in 19% of single-family homes, but in only 13% of multifamily (2 to 4 unit) homes.

* Evaporative cooling is found in 9% of single family homes, and in 35% of mobile homes.

* Electricity claims a 31% share of multifamily (5 units or more) homes – about double this fuel's saturation for other types of homes.

* Butte County has a 6% saturation of natural gas air conditioning, while Shasta County has a 48% saturation of evaporative cooling for its homes.

San Francisco itself offers slim pickings as a market for residential central air conditioning systems, according to Andy Ketchem of Atlas Heating. "New housing has been down very severely in the Bay Area, and existing home heating systems don't take the beating they do in other climates, so they tend to last longer."

The state's mandated energy efficiency minimums for appliances hasn't affected business one way or the other, he believes. "The homeowner isn't given a choice on efficiency levels, so there isn't any shopping around for cheaper, lower efficiency units. We're all in the same boat."

Age of heating system, single-family, owner occupied

606,000 units

Years old	% of total
0 to 3	15%
4 to 10	17%
11 to 20	28%
21 to 40	28%
41-plus	4%
No response	8%

Average shipments to area

Furnaces	40,000
Heat pumps	4,000
Central air conditioners	6,000
Humidifiers	1,000

SATURATION PATTERNS

1,232,000 housing units

	Single family 745,000	Multi family 487,000	Owner occupied 640,000	Renter occupied 492,000
FUEL USE				
Utility gas	93%	69%	94%	73%
Bottled or LP gas	1%	—	1%	1%
Fuel oil	—	2%	—	2%
Electricity	4%	22%	4%	19%
Other or none	2%	7%	1%	5%
HEATING SYSTEM				
Warm air furnace	72%	26%	76%	29%
Steam or hot water	1%	15%	2%	12%
Built-in electric units	1%	19%	2%	16%
Floor, wall, pipeless furnaces	23%	24%	19%	30%
Room heaters	2%	10%	1%	9%
Fireplaces, stoves, portable heaters	—	3%	—	1%
Other or none	1%	3%	—	3%
COOLING SYSTEM				
Central	7%	5%	7%	4%
Room unit	6%	5%	6%	4%

[illegible]

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Seattle

Recent court rulings have overturned attempts by Puget Power & Light Co. to restrict additional electric service for a wide variety of appliances.

However, the company, in an attempt to scale back electric use, has developed an incentive program it hopes will ease the way for replacement heat pumps and high-efficiency water heaters.

The heat pumps will be added to its weatherization program, which involves partial financing by the utility for their installation.

Through conservation initiatives, the price of electricity will be lower and all customers are eligible for some form of conservation incentive. How much the energy problem affects comfort conditioning products will have a direct impact on heating-cooling contractors.

"Everybody says the replacement market is a big deal, but I haven't seen much evidence of it," says Clarence Boehm, of Air King Heating & Air Conditioning. "We do a big heat pump business, especially in new housing, but as a replacement item, it's still very hard to sell. People just don't want to make that initial investment. You're talking about a fair amount of money, depending on the sheet metal involved, and today's interest rates can dampen a lot of enthusiasm for getting loans."

In addition, he notes, 90% of the people in the region can get along without air conditioning in the cooling season, so the heat pump has to be sold largely on its heating-mode characteristics.

Age of heating system, single-family, owner occupied

350,000 units

Years old	% of total
0 to 3	20%
4 to 10	23%
11 to 20	26%
21 to 40	28%
41-plus	1%
No response	2%

Average shipments to area

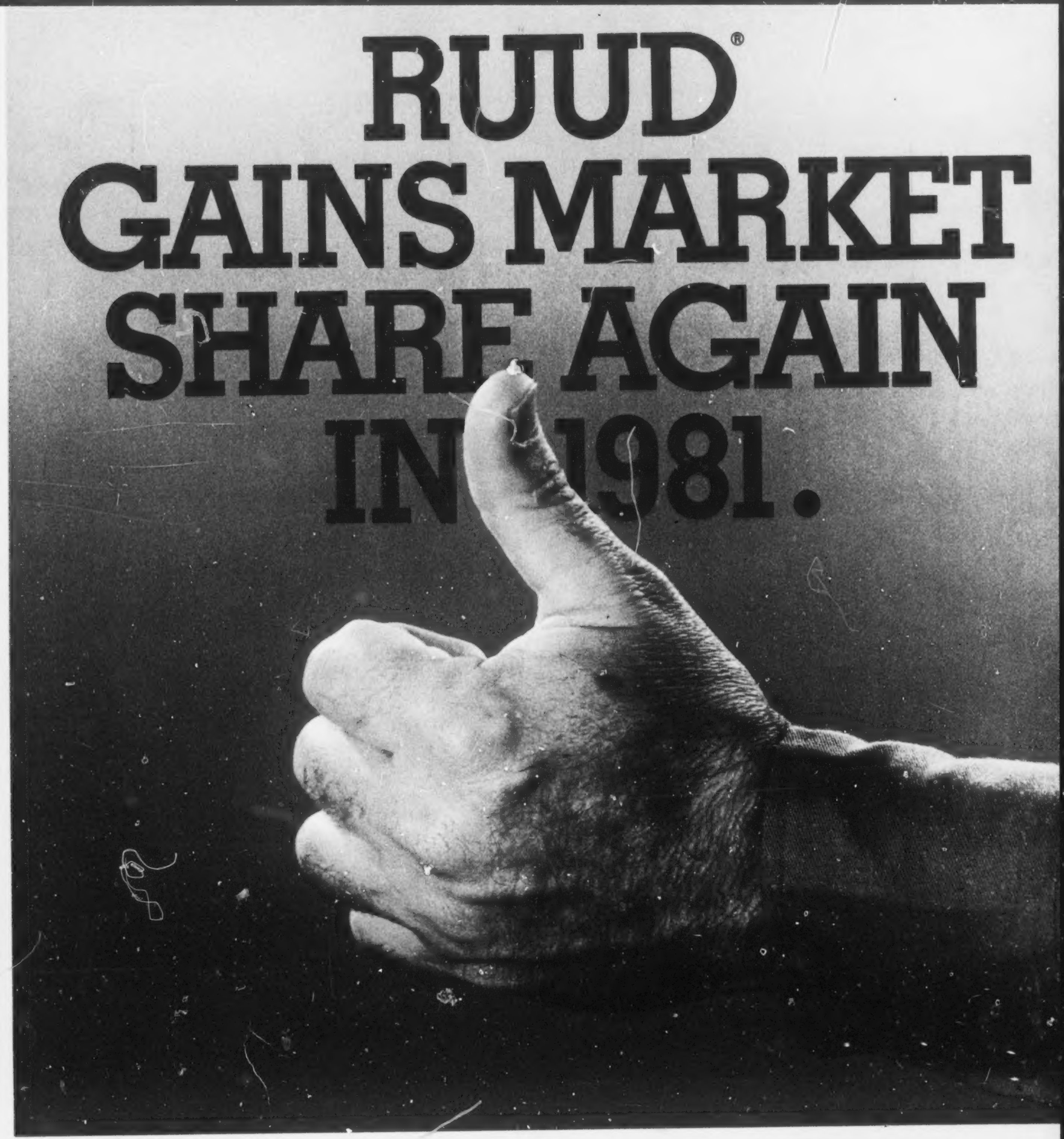
Furnaces	**10,000**
Heat pumps	**3,000**
Central air conditioners	**3,000**
Humidifiers	**2,000**
Vent dampers	**1,000**

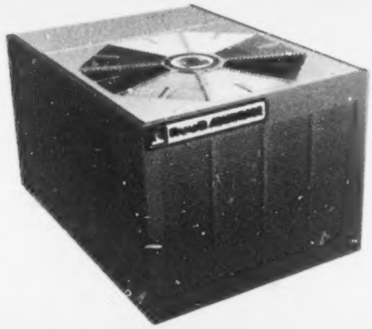
SATURATION PATTERNS

676,000 housing units

	Single family 410,000	Multi family 266,000	Owner occupied 365,000	Renter occupied 311,000
FUEL USE				
Utility gas	36%	19%	33%	16%
Bottled or LP gas	1%	—	—	—
Fuel oil	33%	13%	32%	12%
Electricity	29%	62%	28%	59%
Other or none	1%	6%	7%	13%
HEATING SYSTEM				
Warm air furnace	75%	7%	72%	20%
Steam or hot water	5%	7%	5%	7%
Built-in electric units	13%	81%	17%	68%
Floor, wall, pipeless furnaces	—	3%	4%	2%
Room heaters	2%	3%	4%	1%
Fireplaces, stoves, portable heaters	2%	2%	2%	1%
Other or none	3%	—	—	1%
COOLING SYSTEM				
Central	3%	2%	2%	2%
Room unit	3%	2%	2%	2%

RUUD® GAINS MARKET SHARE AGAIN IN 1981.





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Ruud's remarkable story of growth continues. In 1981, Ruud achieved approximately a 20 per cent increase in its share of the market.

That makes four years in a row that Ruud has recorded an increase in market share.

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FROM PAGE 36

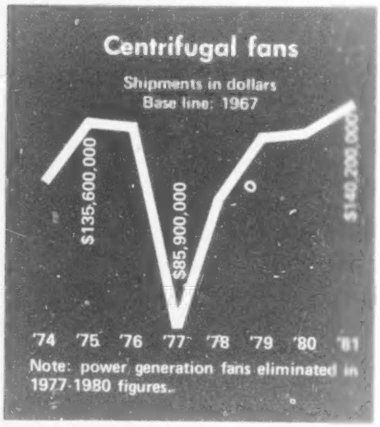
totaled $140,184,744, an increase of 5% over the previous-year figure of $133,832,035.

Industrial axial and propeller fan shipments last year amounted to $65,181,487, up 10% over 1980 shipments of $59,462,459.

The value of power roof ventilator shipments in 1981 was $55,452,974, down 5% from the 1980 total of $58,706,442.

Shipment values for louvers, dampers, and shutters increased by 13% in 1981 to $50,095,585. The total for the previous year was $44,353,281.

AMCA in 1978 eliminated fans shipped to the power generation market and placed them in another category which it does not make public.

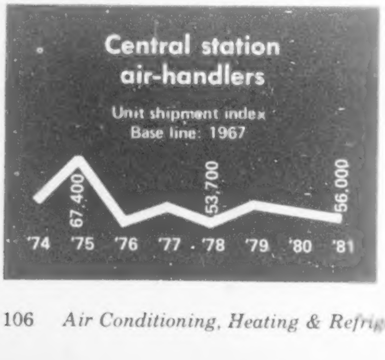

Centrifugal fans

Shipments in dollars
Base line: 1967

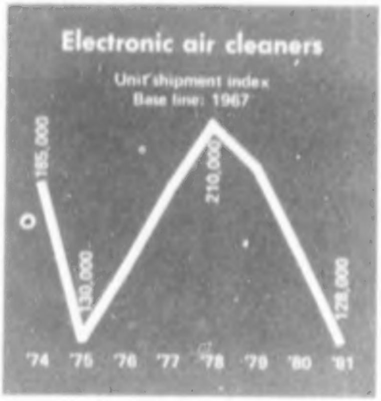
Note: power generation fans eliminated in 1977-1980 figures.

Central station air handlers

Shipments of central station air handlers held even in 1981 at about 65,000 units. Look for as much as a 10% drop this year as U.S. shipments, which represent all but about 8,000 exported units, reflect the decline in commerical and industrial activity.


Central station air-handlers

Unit shipment index
Base line: 1967


Electronic air cleaners

Unit shipment index
Base line: 1967

Electronic air cleaners

Total shipments of electronic air cleaners (eac's) dropped by 20% last year to 128,000 units from 160,000 units shipped in 1980, which itself was a 15% drop from previous-year levels.

Like humidifiers, the twin impacts of pressures on disposable income and a depressed new home market have combined to make the outlook poor for this product until economic conditions improve.

The electronic air cleaner has a special compatibility with heat pumps because of its ability to keep the indoor coil clean in witner when it runs dry. Too, because of the abnormally high number of furnace replacements, eac shipments should be much healthier.

Either contractors are not trying as hard to sell this product or homeowners are resisting on grounds that the extra expense of a high-efficiency furnace already has strained their budget. In this case, high interest rates on borrowed money also could be a factor.

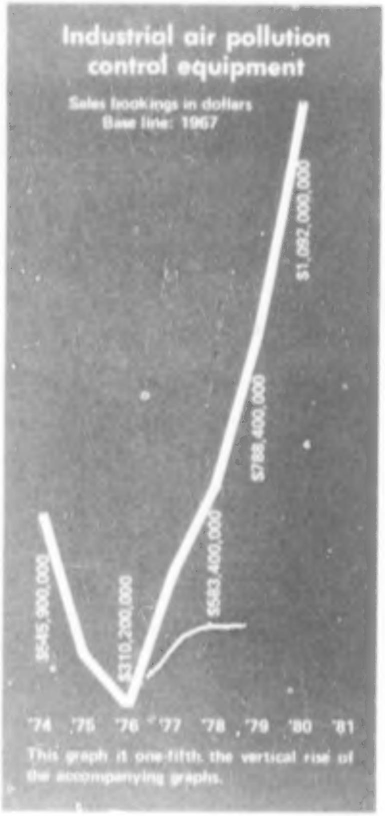
Each Statistical Panorama includes the latest data available. Sources frequently revise their previous year's figures, which explains apparent discrepancies between the latest and the earlier published data. Where sources give significantly varying information, that data is mentioned.

Dehumidifiers

Shipments of dehumidifiers, which reached their peak in 1979, dropped by 20.4% last year, according to the Association of Home Appliance Manufacturers (AHAM).

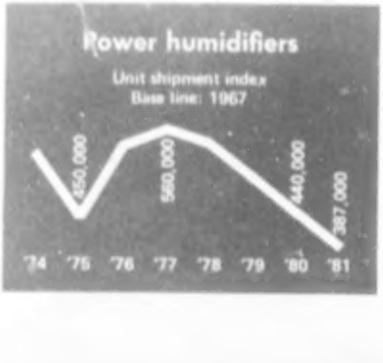
Manufacturers shipped 536,100 units in 1981, down from 673,300 units the previous year. AHAM predicts a slight improvement to 544,000 units in 1982.

It might be noted that, in its latest report, the Census Bureau reported that 1980 dehumidifier shipments amounted to 734,738 units, up from a revised figure of 728,148 units in 1979.


Industrial air pollution control equipment

Sales bookings in dollars
Base line: 1967

This graph it one-fifth the vertical rise of the accompanying graphs.


Power humidifiers

Unit shipment index
Base line: 1967

Automatic vent dampers

Automatic vent damper shipments for 1981 totaled approximately 410,000 units, of which about 80% were thermally actuated; the balance were electrically or mechanically actuated. The 1981 production was about 15% below that of 1980, and industry marketers expect 1982 to be a flat year at best.

They point to a general decline in disposable income, higher unemployment in the northeastern and midwestern states where the dampers have their highest use, and a general tightening up of homes already performed by homeowners facing high fuel bills.

Somewhere between 10% and 15% of dampers are installed at the factory as an original equipment item on fossil fuel-fired furnaces and boilers. The remainder are sold through wholesaler outlets and department stores as an aftermarket item installed by contractors.

A vent damper breakdown, offered by one industry specialist, shows: 3-in. dampers 28%; 4-in. dampers 17%; 5-in. dampers 29%; 6-in. dampers 18%; 7-in. dampers 5%; and 8-in. and over 3%.

Comfort in construction

The task of providing true comfort at home and at work with the greatest efficiency possible in a mass market is difficult for both the public who will use the products and systems and for the contractors, manufacturers, and others in the distribution chain who will provide them.

The problem is more one of education than one of technology. In our opinion, both groups have largely passed through the first stage — awareness of the need for change to avert needlessly high energy costs. Three and fourfold increases in fuel costs have helped, along with some bumbling approaches by Congress and by government agencies.

Progress is now being made in the second stage: Departure from traditional equipment that, although somewhat more expensive to buy, provides former levels of comfort at an affordable price despite energy cost increases. The new equipment is mostly readily available and the public, in ever-increasing numbers, is responding positively.

The third stage, which probably will begin in 1983 and last into the foreseeable future, will be a time when the education of both the public and government will be largely complete. Then the job of providing comfort and substantially higher efficiencies can go forward hand in hand.

In the days of cheap and abundant natural gas, there was little incentive to purchase anything better than an inherently reliable atmospheric gas furnace or boiler with a standing pilot. But with a fourfold increase in gas prices for some since 1972, and more increases promised with decontrol in 1985, improvements were sought.

The first solution was an electronic ignition device to replace the standing pilot and a vent damper to cut down on standby losses. There was also limiting derating of oversized equipment. Then came recuperative furnaces, power burners, and pulse combustion units. Each represented a quantum leap in seasonal efficiency and, with them, varied extra first costs.

In the case of oil-fired units, flame retention head burners and other high efficiency options were added to new and existing furnaces and boilers. A pulse combustion boiler, also available only for gas service, became a standard product.

Homeowners, who were being reminded of the problem with each fuel bill, began to seek out the options available to them. Contractors were a basic source of information, of course, but we think a much wider cross section of the public was — and is — being reached by utility residential conservation service (RCS) programs. Some electric utilities in the south helped even more by offering incentives for high efficiency equipment.

And the public has been reacting. More and more are replacing older, but still reliable, equipment in order to save on operating costs. In fact, it was the main driving force in last year's market, which would have been otherwise severely impacted by the depressed level of housing starts. A recent reader survey confirms that it is the main driving force again this year — and probably for many years to come.

The story is even more evident with central air conditioners and heat pumps.

In the late 1960's and early 1970's, condenser surfaces got smaller and condenser fan speeds got higher as manufacturers tried to hold the line on price in a competitive market dominated by builder purchases. The EER's (energy efficiency ratios) of five and six didn't matter much because electricity was cheap.

But as electricity costs doubled and tripled and as the growing southern market, where seasonal cooling costs rival the seasonal heating costs in the north, became more important, the industry began to develop equipment to meet the need.

Condenser surfaces expanded and multiple-speed condenser fans were added, moves that made outdoor units much quieter as well. Compressors were improved and 2-speed models were offered. Larger units had two or more compressors to provide more modulation.

The performance of heat pumps in northern applications was improved. Cooling performance, although still a compromise, was improved significantly. New single- and two-speed compressors were offered and, ultimately, came inverter drives with even more modulating capability.

TURN TO NEXT PAGE

FROM PRECEDING PAGE

Defrosting methods and controls were improved.

According to our records, these moves really started to show in the marketplace in 1973, which meant laboratory work was going on long before that. We arbitrarily picked an EER of 7.5 as the line separating the high-efficiency equipment from the rest and, through 1976, we doubt that 15% of shipments were in the high-efficiency category.

The Air-Conditioning and Refrigeration Institute (ARI) reported that, in 1978, a total of 36.7% of all units shipped had EER's of 7.5 or more. That share rose to 44.3% in 1979 and to 50% in 1980. Using the more stringent SEER (seasonal energy efficiency ratio) as a yardstick, the figure for 1981 was 55%, or just over 1 million units.

Looking further, last year 70,500 units shipped had SEER's of 9.5 or more and, of these, about 45,000 units had SEER's of more than 10.

Similarly, 55.3% of heat pumps shipped in 1980 had EER's in the cooling mode of 7.5 or more. This percentage moved up sharply to 72% last year, a clear reflection of the public's willingness to pay for extra efficiency.

It is a clear-cut example, too, of the effectiveness of the free market in handling a complicated problem efficiently.

For example, those living in hot climates such as Houston or Phoenix would be ill-advised to buy anything but a high-efficiency unit. But the answer was not so clear in, say Detroit, with much fewer operating hours in which to pay back the extra equipment cost. But with new stepped electric rates that can climb to 11 cents/kWh without an air conditioning load, the option of high efficiency looks much more attractive.

When three manufacturers first offered add-on heat pumps designed for electric and fossil fuel-fired furnaces, there were few takers.

Today, however, this market is growing rapidly. Some homeowners are installing this option in new homes, but most are heat pump replacements for worn out air conditioners in areas where fuel costs justify their use.

Most are being installed on electric, oil, and LP gas furnaces but a few, especially in the northeast, are going on gas furnaces.

Housing characteristics

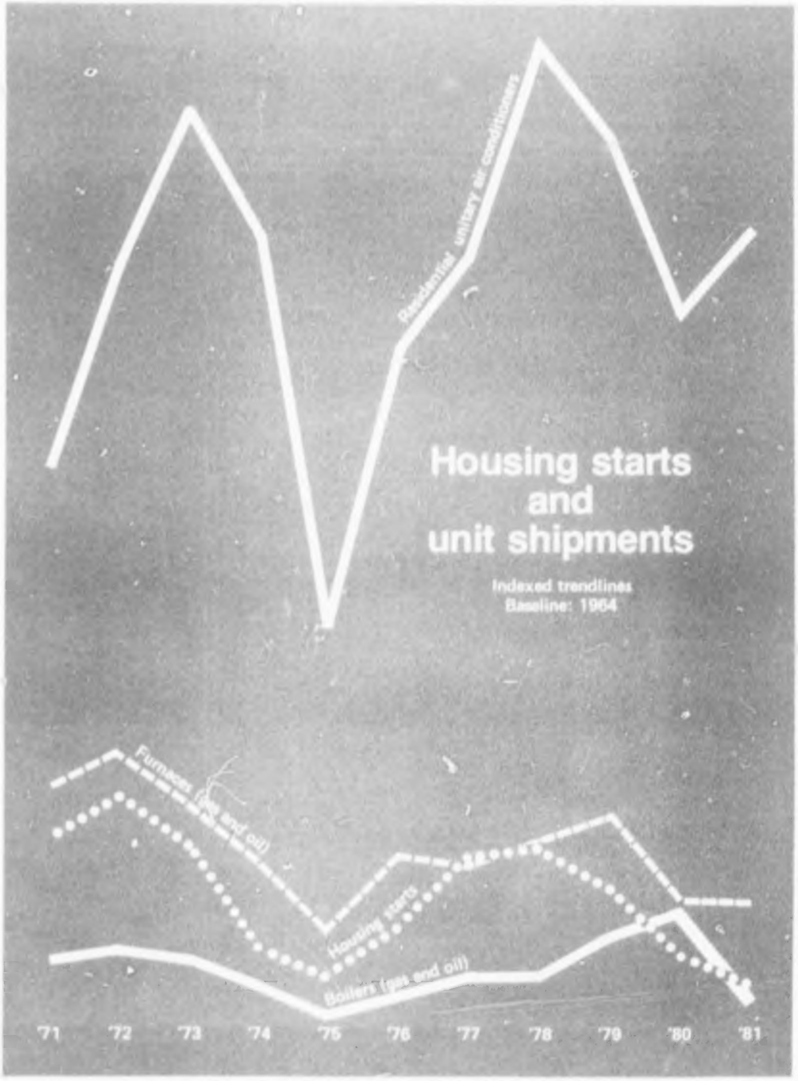
Again this year, The News has added another dimension which allows us — and the industry — to get closer to what's happening in today's home comfort market. Normally, the characteristics of new homes completed last year would not be available until September.

But because of an exclusive arrangement between The News and the Bureau of the Census, we are able to report now (see accompanying table on page 110) on housing comfort system characteristics a full six months ahead of the official publication date.

National statistics, too, have an annoying habit of clouding what's really happening in important regions and in local markets. With this in mind, The News has again included elsewhere in this issue a breakdown of the residential markets of 40 cities and four principal regions. Included for the first time are the ages of the city's heating systems, an important factor in determining replacement market potential.

Because of cutbacks in its budget, the Census Bureau has delayed many reports, among which is one on characteristics of new homes built last year.

TURN TO PAGE 113



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Heating-cooling-fuel new home characteristics

(Based on two quarters revised, one quarter preliminary Census Bureau figures. All numbers are rounded.)

	1980					1981				
	U.S. total	Northeast	North Central	South	West	U.S. total	Northeast	North Central	South	West
Single-family homes completed	715,000	74,000 10.5%	126,000 17.7%	338,000 47.2%	177,000 24.1%	624,000	66,000 10.5%	104,000 16.6%	308,000 49.3%	146,000 23.3%
Space heating fuel										
Gas	296,000 41.4%	25,000 33.8%	75,000 59.6%	102,000 30.2%	93,000 52.5%	261,000 41.8%	22,000 33.3%	65,000 63.5%	97,000 31.5%	76,000 52.1%
Electricity	361,000 50.1%	27,000 36.5%	35,000 27.8%	226,000 66.9%	74,000 41.8%	311,000 49.9%	26,000 39.3%	29,000 27.9%	198,000 64.2%	59,000 40.4%
Oil	24,000 3.4%	14,000 19.1%	5,000 4.1%	5,000 1.5%	— —	12,000 1.9%	8,000 12.1%	3,000 2.8%	3,000 1.0%	— —
Other/none	34,000 4.8%	8,000 10.9%	11,000% 8.7%	5,000 1.5%	10,000 5.7%	40,000 6.4%	10,000 15.1%	7,000 6.8%	10,000 3.2%	11,000 7.6%
Heating systems type										
Warm air furnace	408,000 57.1%	25,000 33.8%	88,000 69.9%	182,000 53.8%	113,000 63.9%	356,000 57.1%	21,000 31.8%	74,000 71.1%	170,000 55.2%	92,000 63.1%
Heat pump	176,000 24.6%	7,000 9.4%	15,000 12.1%	116,000 34.3%	36,000 20.3%	151,000 24.2%	8,000 12.1%	11,000 10.6%	98,000 31.8%	33,000 22.6%
Hydronic	28,000 3.9%	17,000 23.1%	7,000 5.5%	— —	— —	19,000 3.1%	13,000 19.7%	3,000 2.9%	— —	— —
Electric baseboard/ panel/radiant	61,000 8.5%	18,000 24.3%	11,000 8.7%	17,000 5.1%	15,000 8.5%	54,000 8.6%	15,000 22.7%	11,000 10.5%	18,000 5.8%	10,000 6.9%
Other/none	42,000 5.9%	7,000 9.4%	5,000 4.1%	23,000 6.8%	13,000 7.4%	44,000 7.0%	9,000 13.7%	5,000 4.8%	20,000 6.5%	11,000 7.5%
With central air conditioning	451,000 63.1%	22,000 29.7%	58,000 46.1%	287,000 84.9%	84,000 47.5%	401,000 64.3%	18,000 27.3%	50,000 48.0%	259,000 84.0%	73,000 50.1%
Multifamily homes completed	419,000	35,000 8.3%	82,000 19.5%	185,000 44.1%	116,000 27.6%	324,000	31,000 9.5%	59,000 18.2%	153,000 47.3%	81,000 25.0%
Space heating fuel										
Gas	124,000 29.6%	13,000 37.1%	36,000 43.9%	25,000 13.5%	50,000 43.1%	101,000 31.2%	18,000 58.0%	29,000 49.1%	19,000 12.4%	33,000 40.7%
Electricity	281,000 67.1%	14,000 40.1%	47,000 57.2%	160,000 86.5%	62,000 53.4%	215,000 66.3%	8,000% 25.8%	30,000 50.8%	133,000 86.9%	44,000 54.3%
Oil	10,000 2.4%	8,000 22.9%	— —	— —	4,000 3.5%	6,000 1.9%	5,000 16.1%	— —	— —	— —
Other/none	4,000 1.1%	— —	— —	— —	— —	2,000 0.6%	— —	— —	1,000 0.6%	4,000 4.9%
With air conditioning	355,000 84.7%	26,000 74.3%	70,000 85.3%	177,000 95.7%	81,000 69.8%	275,000 84.8%	26,000 83.8%	49,000 83.0%	148,000 96.7%	54,000 66.6%

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Comfort in construction

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However, three quarters' worth of construction statistics are available, and the figures show the picture for the first nine months of 1981, compared with the same period in 1980.

In the single-family sector, a net loss of 91,000 units represents a 13% decline, with a commensurate loss of heating and air conditioning systems for those homes.

In specific terms, the reduced homebuilding level represents 20,000 fewer heat pumps, 52,000 fewer furnaces, 9,000 fewer hydronic systems, and a net loss of 50,000 centrally cooled homes.

Multifamily construction suffered a net loss of 23,000 units, a 19% decline from the same period in 1980.

In regional terms, single-family construction dipped by 8,000 units in the northeast (down 11%); by 22,000 units in the north central region (down 17%); by 30,000 units in the south (down 9%); and by 31,000 units in the west (down 17%).

Heating systems remained fairly constant nationally. Warm air furnaces retained a 57% share followed by heat pumps, which had the same saturation (24%). Hydronic systems — 68% of which are in the northeast — account for only 3% of the market.

Likewise, fuel use changed very little in 1981, with electricity claiming a 50% share, followed by gas at 42%. Oil continues its decline to about 2%.

If the census data are accurate, they reflect a continuing shift to "other" fuel sources in the northeast, where 15% of new homes (10,000 units in all) do not use the three conventional fuels.

Heat pumps in new homes continue to be largely a southern and western phenomenon. In both 1980 and 1981, 65% of heat pumps went to homes built in the south, and 20% of them went to homes in the west.

Simply annualizing heat pumps from the nine-month base, they would approach about 200,000 units for new single-family homes.

Fuel costs

A two-year tally of fuel prices prepared by the U.S. Department of Labor as part of the cost-of-living index shows that, from December, 1980, to December, 1981, fuel oil prices nationally increased from $1.022/gal to $1.247/gal.

During the same period, natural gas nationally rose from $41.60 per 100 therms to $46.369 per 100 therms. The prices going into 1982 in the west were $36.201 per 100 therms and, in the northeast, $61.246 per 100 therms.

Similarly, the cost of 500 kWh of electricity nationally increased during the same period from $30.50 to $34.960. The range extended from $32.343 in the west to $46.628 in the northeast.

Conversions

The uneven escalation of fuel prices, together with the widespread availability of natural gas in 1978 after a period of severe curtailments that dated back to 1971, caused a 3-year move to natural gas that is now subsiding.

Conversions to natural gas from other fuels amounted to only 89,000 in 1977. They grew rapidly to 365,000 in 1979 and to 383,000 in 1980, creating a severe shortage in conversion burners.

Although the Gas Appliance Manufacturers Association no longer keeps figures, we suspect that 1981 conversions were just below 200,000 and still falling. There are two main reasons. The easy-to-sell conversions from oil in the northeast and midwest have largely been made. And, as industry officials have stated publicly, every time the decontrol of natural gas prices is mentioned, the conversion rate takes a nosedive.

Conversions to oil from other fuels, which amounted to 50,000 for many years, slipped to 10,000 in 1980 and rebounded to only 11,000 last year. They are likely to stay on that plateau for the foreseeable future.

Although electric heat has never fared well in the conversion market as a predator on other fuels, it is more secure from the blandishments of other fuels that require a chimney. The addition of a heat pump to an electric furnace is hardly a conversion although electric baseboard is sometimes replaced by hydronic baseboard connected to an outdoor boiler fired by gas.

Consumer preferences

In a National Association of Home Builder (NAHB) consumer preference survey of 5,000 households, 60% responded that energy-saving features were an important factor in selecting their home. Additionally, 79% said it would be important if they were to move again.

Referring to comfort, 92% said they were turning down their thermostats in winter and 63% said they were using less air conditioning in summer.

Although 62% said they were willing to spend $500 for added insulation, only 45% said they would be willing to pay $1,200 to $1,500 more for storm or thermal-pane windows. However, 68% of the homes built that year did not have storm windows.

NAHB surveys of builders showed that, in 1973, two-thirds of the homes built that year were insulated to a value of R-13 or less. By 1980, R-25 seemed to be the norm, and R-30 or more was common in severe climate areas.

In 1974, three-quarters of the homes built that year had single glazing and there was practically no triple glazing. In 1980, only one-third of new homes had single glazing while 60% had double glazing and 3% had triple glazing. Insulated doors increased their share of market from 33% in 1974 to 55% in 1980.

Each Statistical Panorama includes the latest data available. Sources frequently revise their previous year's figures, which explains apparent discrepancies between the latest and the earlier published data. Where sources give significantly varying information, that data is mentioned.

Housing & construction

As Statistical Panorama went to press, the nation's housing industry was in the midst of the longest running and most devastating recession since World War II.

If nothing were done in the next six months, total housing starts in 1982 would be lucky to top 700,000 units, or less than the miserable total for only single-family starts last year. What's more, the thrift industry which finances the bulk of home mortgages would join builders in a national wave of failures that would almost certainly engulf many of the contractors, OEM's, and suppliers served by The News.

But, we suggest, something will be done — and soon.

President Reagan now is studying recommendations put forward by a special cabinet task force appointed to study the plight of the housing industry. A concentrated effort by thrift institutions to pressure Congress into a $10 billion bailout of themselves and potential home buyers has a better than even chance of success. And the mobile/manufactured housing industry has had the way cleared for near-normal home financing.

The seriousness of the housing industry problem, together with the prospect of next November's elections, make some type of bailout almost a certainty despite the President's resolve to hold firm in the face of efforts to derail his plan for economic recovery.

Because deposits are guaranteed, the $10 billion of support for the nation's savings and loan institutions and mutual savings banks probably would be the least expensive alternative to mass failures. Too, the political consequences next November would be much more favorable if housing and dependent industries were recovering, however slowly, than if they were laid waste by national economic policy.

Other potential sources of mortgage money could be relaxed regulations covering registered pension plans and the money pouring into banks and other investment institutions since Jan. 1 for the new investment retirement accounts (IRA's).

Private housing starts, which have been slipping steadily since 1978, dropped 16% to 1,086,600 units last year from the mediocre 1,292,200 starts recorded in 1980. It was the lowest total since 1946 and was directly caused by a federal monetary policy that kept mortgage rates at a prohibitive 15% to 18%.

The steepest decline, 17%, came in single-family home starts, down from 852,200 units in 1980 to 706,100 units last year. The 1981 performance was less than half the 1,433,300 units started in 1978.

Multifamily starts didn't fare much better. The 380,500 multifamily starts in 1981 were 13.5% below the 440,000 units started in the previous year — and 206,000 below the level established in 1978.

1982 forecast

In keeping with our earlier statement, we would have trouble justifying a total start figure of 700,000 for 1982 if the conditions were allowed to continue. But political realities being what they are, we don't think that will be the case.

Instead, our belief is that the various forms of federal relief such as buying down mortgages and expanding pension fund mortgage opportunities will result in 1.3 million housing starts in 1982. It's not as much as it could be, perhaps, and most of the surge will come later in the year, but it's as much as we can reasonably expect in an economy that probably still will be plagued by high interest rates and heavy federal borrowing.

Single-family housing starts should recover by 17% to 825,000 units while multifamily starts, helped by more heft in the money marketplace, should increase by 25% to 475,000 units. That's a total of just over 200,000 more units than were started in 1981.

The first order of business for builders, however, will be to unload their present inventories. It's now costing them between $1,500 and $2,000 a month for every $100,000 of construction loans and many have been either reducing prices or buying down mortgage rates in order to move existing inventories.

Although there is no doubt that buyer pressure for new homes exists, it is qualified by mortgage interest rates that touched 18% last year and show no signs of falling below 14% in the foreseeable future. It's unlikely, too, that any federal help will do more than keep the housing industry's head barely above water.

The National Association of Home Builders (NAHB) has asked the cabinet-level task force headed by Housing Secretary Samuel Pierce to consider having the government buy down mortgage rates on new homes and on apartment construction loans. It is also asking for a program to encourage the investment of pension funds in housing by making that portion invested in mortgages tax-exempt to beneficiaries.

The task force report was scheduled to go to President Reagan late in March. Although some help is expected, the President is not likely to back away from his basic program of budget and tax cuts, a program that already is in jeopardy from the recession and an expected $100-billion deficit.

Meanwhile, the U.S. League of Savings Associations and the National Association of Mutual Savings Banks have asked Congress for the $7.5-billion program that would allow savings and loan associations to exchange low-yield home mortgages for debentures carrying higher rates, plus a $2.5-billion interest rate subsidy program for home buyers. They also would like a capital infusion plan to bolster their net worth positions.

Federal Reserve Board chairman Paul Volcker, whose serious overreaction in driving up the discount rate (at which banks borrow money from the federal reserve system) set off the housing slump late in 1978, told home builders in January that the board intends to continue restraint of monetary expansion and will not push more money into the system merely to finance the federal deficit.

Excessive federal deficits, he said, would preempt the money homebuilders and others need to finance their businesses.

Traditionally, there has been a 3% to 4% spread between the consumer price index (CPI) and the prime rate. Although the inflation rate dropped to about 9% last year, the prime rate averaged more than 19% and, in mid-March, still stood at 16% for most banks. The specter of federal deficit financing is likely to keep it high throughout 1982.

Comparing 1978, the last 2 million-unit year, with 1981 performance, housing starts in the north central region were down 75% and in the west by 74%. The northeast was down 68% and the south down 58%. Recovery, when it comes, is expected to be strongest in the south, west, and in states with large defense or high technology industries such as Connecticut and Massachusetts.

If there were bright spots, they were in the south, which commanded 52% of the nation's housing starts, and in the west, with 22%. But at the end of 1981 there were signs that these markets, too, were beginning to experience the ravages of the recession and high interest rates.

Once again, Houston led the nation in new housing units, with a total of 38,530 for the year. The other leaders: Dallas 28,456; Phoenix, 26,652; Los Angeles and Long Beach 24,694; Tampa 23,796; West Palm Beach and Boca Raton 19,099; Washington, D.C. 18,487; Atlanta 18,363; Denver 14,850; and Miami 14,533.

Pressure is there

The housing declines of the past three years were not the result of weakening marketing pressures on either the new home or rental markets.

Vacancy rates have been hugging the 5% mark, considered minimal to allow for renter mobility after substandard units are subtracted, for the whole period. In New York City the vacancy rate is less than 3%, in Chicago 2%, Los Angeles 1%, and in Miami it's less than 1%.

The reason for this demand is simply today's costs are too high and rents too low in most areas to make rental units attractive to investors, especially where there is rent control or the threat of rent control. Renters, too, appear to be paying more than they can afford already. The Census Bureau reported that, between 1973 and 1979, rents increased 66% from a median $133/month to $217/month while their family income increased only 39%.

This explains, in large measure, why nonsubsidized rental units, as a percentage of multifamily starts, dropped from 65% in 1975 to 25% in 1980 and 29% in 1981.

The condominium market on the other hand, is gaining steadily. Condominiums accounted for 13% of all housing starts in 1980 and for more than a third of multifamily starts. The Census Bureau reported that the number of owner-occupied condominiums increased 91% between 1975 and 1979 from 507,000 to 967,000 units.

Demographics also are changing. In the period 1970 through 1980 the nation's population grew 10.9%, yet the population in the northeast and north central states remained about the same. The increases came in the west (23.4%) and the south (19.1%).

New household formations, at 1.7 million a year during the 1970's, far outstripped the annual averages of 1.06 million in the 1960's and 924,500 in the 1950's. With 41 million Americans expected to reach the prime home-buying age of 30 and another 15 million graduating from college, household formations are expected to average 1.8 million during the 1980's.

The traditional family with only one breadwinner, which made up 43% of all households in 1960, had slipped to 25% in 1975 and is expected to drop to 14% by 1990, according to the Harvard-MIT Joint Center for Urban Studies. Married couples, which accounted for 41% of new households in the 1960-1975 period, will account for only 17% by 1990. Almost two-thirds of 1990 households will be without children.

Despite this growing demand, however, the immediate problem today stems from the fact that new home prices have escalated much faster than family income, national financial policy has driven up interest rates beyond the ability of most buyers to qualify for mortgages, and the availability of money for mortgages in the future will be limited by stiff competition from other industries and from government.

The median price of a new home, which escalated 176% between 1970 and 1980, was estimated by NAHB at $69,000 in 1981. Prices have been flat for two years, NAHB reports, because builder buy-downs of mortgages and other creative financing

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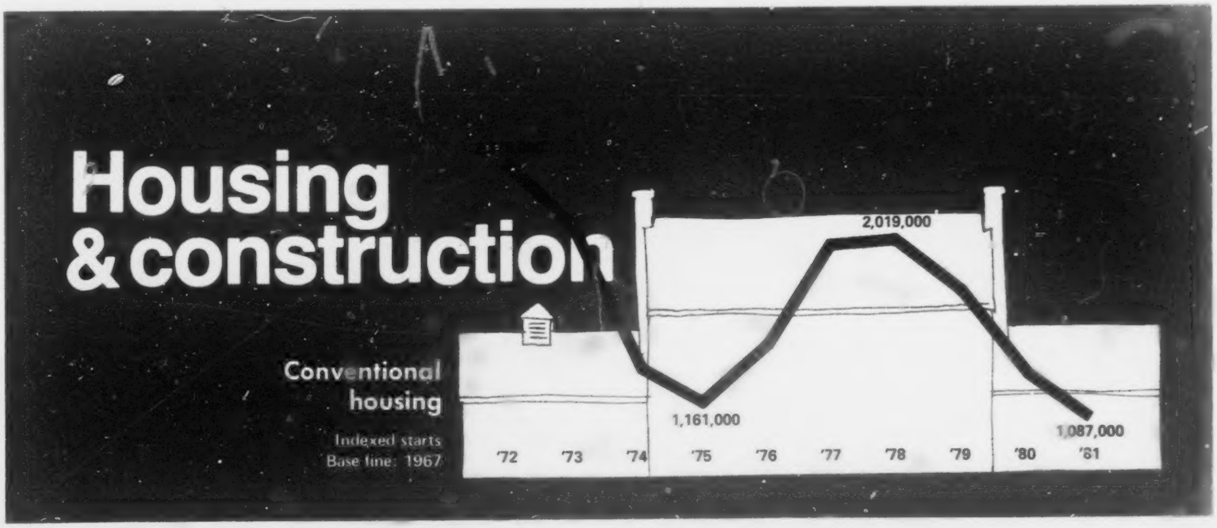

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techniques used to move homes in today's market tend to show a higher-than-actual sales price.

The median price of existing homes, which escalated 170% in the same 1970-to-1980 period, stood at $66,600 in 1981. The National Association of Realtors warned, however, that regional differences — $95,000 in the west, $53,900 in the north central states — are important. Existing home prices escalated only 7% last year, the lowest annual increase since 1970.

To illustrate the difference interest rates make, NAHB said the monthly operating cost of a new home with a $60,000 mortgage at 12% would be $832, including principal, interest, taxes, insurance, heat, utilities and repairs. There is a potential pool of 10.5 million families with the $39,936 annual income needed to qualify for that mortgage.

But if the interest rate is escalated to today's 17%, the operating costs for the same house with the same $60,000 mortgage go up to $1,070 a month. Just as importantly, the pool of potential buyers with the $51,360 annual income needed to qualify for the mortgage shrinks to 4.8 million, or less than 8% of all families.

Money markets

In the past, savings and loan associations and mutual savings banks have supplied as much as 55% of the money for conventional mortgages, most of it from savings. Last year, however, was the worst in their history and many claim they are near collapse.

From January through November, 1981, the net worth (their measure of profit and loss) of federally insured savings and loans declined by $4.3 billion. They lost $23.7 billion in deposits, compared with a net inflow of $8.6 billion.

Similarly, withdrawals have exceeded deposits in the nation's mutual savings in all but four months for the three years ending November, 1981.

At the same time money-market mutual funds have grown explosively over the past two years. From $75.8 billion in December, 1980, they have grown by 133% in one year to $176.6 billion last December.

The influx of funds into the tax-exempt All-Saver accounts introduced in October, 1981, attracted $16.5 billion that month when the interest rate was 12.61%. But purchases of the 1-year certificates dropped to $2.5 billion in November when the interest rate dropped to 10.77%. It is still too early to tell about the impact of the new individual retirement accounts (IRA's) for those already enrolled in company pension plans which was introduced in January.

In order to move new and existing homes, builders and owners have come up with a wide range of mortgage and creative financing plans. There are variable rate mortgages, 3-year negotiable mortgages, pledged account mortgages, and reverse annuity mortgages.

One Cleveland, Ohio, builder has put up $2 million of its own equity and entered into a partnership with Cardinal Federal Savings and Loan to offer buyers 30-year mortgages, with the first 10 years at 10.75% and the remainder at the then-current rate. Zaremba Building Co. also is seeking cost cuts from subcontractors in return for work.

In surveys conducted by the University of Michigan, consumers set an all-time record low in enthusiasm for new home purchases in 1981. A total of 81% said they are not interested in a new home because of tight credit and high interest rates. Almost gone was the rationale of buying now because it will cost more later. The highest interest rate they were willing to pay was 11.8%. Too, resistance to variable rate mortgages was overwhelming.

Multifamily

In forecasting a 25% recovery in this market to 475,000 units this year, we took into consideration the fact that multifamily builders with land already purchased probably will be the quickest to react to any federal help, especially if they can take advantage of subcontractor distress to get lower prices.

Multifamily builders, too, have the advantage of strong market pressures, especially in the south and in major cities and have continued to attract investment from abroad which is somewhat independent of domestic money rates. Investors from South and Central America and from the Middle East are more interested in security than in immediate return.

Most of the increase, we feel, will come from condominiums and in developments, including high-rises, with more than five units. Rental, subsidized, duplexes, and fourplexes will remain at 1981 levels or, perhaps, slip just a bit.

Mobile homes

Shipments of mobile/manufactured homes in 1981 totaled 240,000 units, up 8.4% from the previous year's total of 221,500 units. The increase in these site-delivered homes, popular with retired people and those with moderate incomes, came despite the recession and high interest rates.

Although not counted in the official housing statistics, shipments of these homes amounted to 34% of all private single-family housing starts and 22% of all site-built homes started in the U.S. last year. The Manufactured Housing Institute (MHI) reported that the average cost of a new mobile/manufactured home last year was $19,400, including set-up and furniture but not land.

The biggest news for this industry, however, came from Housing and Urban Development Undersecretary Donald J. Horde, who announced that mobile/manufactured homes soon will be eligible for FHA Title II, Section 203.B financing.

Bureaucratic terms aside, it will increase mortgage loan limits, 100% insured, to $90,000, with maturities up to 30 years, and for the first time will include both land and building.

Limits on home and land loans will be boosted to $35,000 for 20 years for single-section models on developed lots, and to $47,500 for multiple-section models on developed lots. The limits for the lot only will be raised to $12,500.

Although HUD is removing the last financial obstacle to the development of manufactured housing on private lots, where it can be taxed as real rather than personal

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property, many local jurisdictions still have zoning ordinances on the books that restrict these homes to rental parks and prohibit their location on dweller-owned land in more desirable communities.

"It might not be too far off when manufactured homes amount to half of the new homes sold nationally each year," said one manufacturer. "Maybe by then people will realize that a house is what it is, not how it was made or where it came from."

The public housing market, at 125,900 HUD public housing units and 70,100 subsidized units in 1980, dropped 27% last year to 77,400 HUD public housing units and 64,900 subsidized units. Budget cuts almost certainly will cut these totals drastically in 1982.

Labor

With a significant number of the 45% of construction labor contracts up for renewal this year located in the states affected most by the economic slowdown, industry observers are waiting to see if construction unions and management will continue the unprecedented survival dialogue initiated in the automotive and other industries.

High unemployment, the growth of nonunion or foreign competition, and high interest rates have brought about conditions which have resulted in management proposing, and sometimes receiving, concessions in contracts from items which make them noncompetitive.

A major unknown for 1982, especially since the heaviest bargaining will be occurring in states impacted the most by the economic slowdown, is whether similar results will be achieved in the construction industry, according to the Construction Labor Research Council (CLRC).

Looking back on the year just ended, the Bureau of Labor Statistics (BLS) reports that settlements were reached during 1981 which covered about 26% of construction workers. The average first-year wage adjustment was 13.5% and the average contract duration was 27.6 months.

In the construction industry, the average first-year increase for those contracts with cost of living (COLA) clauses was 8.8% while the average increase for contracts without COLA clauses was 14%. The first-year increase for contracts in all industries was 10.1%.

Work stoppages in 1981 were at the lowest level in decades, according to BLS. Idleness as a proportion of estimated available working time, at 1.1 days per thousand, the number of workers involved in strikes (1.1 million), and the total man days of idleness (24.7 million) were the lowest since the 1960's. The number of strikes starting during the year, at 2,577, was the lowest since 1940.

The year was not without some problems for construction, however. There were 240 construction work stoppages last year, only 47 fewer than in 1980, which involved 212,000 workers and resulted in 4,483,000 man days of idleness. In 1980, the man days of idleness totaled 4,752,500.

Major strikes occurred in Beaumont and Houston, Texas; Boston, Mass.; Chicago, Ill.; Minneapolis-St. Paul, Minn.; New Jersey; Colorado; western Tennessee; and Washington, D.C.

The nation's average construction labor rate, based on the rates in 30 major U.S. cities, increased by 11.9% from January, 1981, until January, 1982, according to R. S. Means Co., Inc.

Alaska, with a 7.7% increase in 1981, holds the nation's highest rate of $25.48/hour. North Carolina, with an increase of 8.9%, held the lowest rate at $11.55/hour.

Means Construction Cost Index also noted that mechanical trades construction costs increased by 10.1% last year compared to a national average for all trades of 9.12%.

According to CLRC, the average increase in wages and fringes for construction workers during the past five years was $5.43/hour, bringing the average hourly rate in the U.S. to $17.01/hour. This is an increase over five years of 47%. Among the crafts, the largest increases went to boilermakers, electricians, and elevator constructors.

In a reversal from the experience of recent years, wages and fringes during 1981 increased more rapidly than the consumer price index. This occurred nationally and for each region. The largest increase, 13%, came in New England and the smallest, 4.9%, came in the southeast and west north central zones. The experience will be repeated in 1982, although the highest increases, at 10% (11.3% in the northern plains and mountain states) will be more modest.

In recent years, about 45% of construction contracts expire each year. In 1982, agreements covering 675,000 workers will be up for renegotiation. The heaviest bargaining will be in states north of or bordering the Ohio River and east of the Mississippi river. Other states with heavy bargaining scheduled are Arizona, Iowa, Maryland, Montana, and New Mexico, according to CLRC.

Also due to negotiate new contracts this year are Pittsburgh, Pa.; Wheeling, W. Va.; Youngstown, Cleveland, Toledo, Columbus, and Cincinnati, Ohio; Detroit, Mich.; Indianapolis, Evansville, and Fort Wayne, Ind.; Louisville, Ky.; and Milwaukee, Wis.

For the large number of contracts already settled through 1982, CLRC reported the average increases are $1.70/hour, or 9.8%. For 1983, the average increase falls to $1.66/hour but, because of the higher base, the percentage falls to 8.9%.

Cost of living adjustments will be primary determinants of the 1982 increases in California, Oregon, and

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Washington. These three states account for more than half of the contracts in the country tied partly or entirely to changes in the consumer price index.

Crafts

The average wages-plus-fringes rate for the United Association (UA) pipefitter and pipefitter-plumber combined locals in the U.S. on Jan. 1, 1977 was $12.82/hour. By Jan. 1, 1982, that average rate had increased by $6.09/hour, a 47.2% increase, according to figures supplied by CLRC.

The lowest increase was $4.71/hour (to a 1982 rate of $15.73/hour) in the southeast. The highest were $8.41/hour (to $24.15/hour) in the southwest Pacific region and $17.27/hour (to $22.51/hour) in the northwest.

UA plumber-only locals averaged $13.21/hour on Jan. 1, 1977, and on Jan. 1, 1982, the wages-plus-fringes package had increased 46.4%, or $6.12/hour, to $19.34/hour.

Members of the Sheet Metal Workers' International Association (SMWIA) received a national average of $12.63/hour on Jan. 1, 1977. By Jan. 1, 1982, the wages-plus-fringes package had increased $6.04/hour, or 47.9%, to $18.67/hour.

The lowest increase for sheet metal workers was the $4.71/hour received by locals in the southeast to bring them, in 1982, to $15.73/hour. Again the highest increases were the $8.41/hour (to $24.15/hour) in the southwest Pacific region and the $7.27/hour (to $22.51/hour) in the northwest.

The average percentage increases from Jan. 1, 1981, to Jan. 1, 1982, were 11.3% for sheet metal workers, 10.7% for pipefitters and pipefitter-plumber combined locals, and 10.2% for plumbers. The only exception to the 9% to 13% wage increases last year was the 17.3% increase for plumbers in New England.

Wholesalers

Air conditioning and refrigeration parts-and-supplies wholesalers are confident that 1982 sales will outstrip inflation — but not by much. A late 1981 forecast by members of the Air-Conditioning and Refrigeration Wholesalers (ARW) indicates an overall increase of 11.8% in dollar sales compared to their performance in 1981.

A year previously, the wholesaler group forecast a 1981 dollar gain of 10.2%. This compared with an actual gain of 8%, about the same as in 1980 and the second flat year in a row for parts-and-pieces wholesalers.

As in past years, wholesalers believe replacement compressors will pace other products with a 15% increase in dollar volume (20.6% in the west). Capacitor dollar sales are expected to go up by 12% across the nation and an 11% increase is expected for the category of driers, strainers, filters, and sight glasses.

Canadian wholesalers, who expect sales to increase by 10.8% this year, are expecting an 11% increase in residential unitary air conditioning and heating equipment sales — almost twice the U.S. average — and a whopping 20% hike in the sale of sheet metal and fittings compared to 1981 performance.

In a later report, ARW estimated the total dollar volume of its U.S. members in 1981 at $1,465,235,546, an increase of 12.5% over year-previous performance. The total volume of its Canadian members last year was estimated at $159,498,234, an increase of 13.4% over their performance in 1980.

The largest increase, 18.9%, came in Region 3 (Virginia, Maryland, Delaware, and part of Pennsylvania) while a 14.7% increase was recorded in Region 9 (California, Oregon, Washington, Montana, Idaho, Nevada, Utah, and Arizona). The lowest increase, 0.3%, was in Region 6 (Wisconsin and part of Illinois).

Despite the economic downturn, ARW members showed a 6% increase in U.S. sales, and nearly 12% for Canadian members, in the fourth quarter of 1981 compared with the same period last year.

Members of the Northamerican Heating and Airconditioning Wholesalers Association (NHAW) use a three-year forecast, revised each quarter, for five key product groups — air conditioning, refrigeration, controls, sheet metal, and plumbing (which includes liquid solar systems and hydronic heating).

(For the NHAW outlook in chart form, see page 122.)

The forecast is prepared for NHAW by William Spooner Associates, Inc., using an econometric model maintained by the University of California-Los Angeles (UCLA) and sales data supplied by NHAW members.

It provides members with forecasts in three modes — one that reflects seasonal fluctuations and unadjusted dollar volumes, one that is annualized to eliminate seasonal fluctuations and show trends more clearly, and the one we have reproduced here which has been annualized and adjusted for inflation to more accurately portray physical volume.

The study for February, 1982, indicates that:

Air conditioning is projected to reach its base period volume by the end of 1982, after which it will continue to rise, so that a volume of 150% of the 1980 second quarter level will be reached by the end of 1983.

Refrigeration sales volumes show a decline from the base period through the remainder of the forecast horizon, with inflation-adjusted sales volume about 95% of the base period at the end of 1983.

Controls are forecast to remain essentially level in volume through 1982, with a slight increase in early 1983, reaching a level of 110% of the

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Bureau of the Census data

A 10-year look at air conditioning and refrigeration unit shipments

Product	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Condensing units	407,034	391,992	501,313	474,771	334,679	417,286	529,515	537,082	497,833	456,695
Compressors & compressor units	16,272,922	16,692,164	21,812,788	19,134,563	19,240,243	22,761,950	23,991,643	25,790,862	24,970,111	19,807,229
Ammonia compressors	1,475	1,564	1,725	1,714	1,449	1,453	1,443	1,819	2,014	1,860
Fancoil units[1]	245,742	225,017	265,699	284,267	200,807	193,587	198,939	186,827	178,719	247,406
Induction units[2]	119,324	92,631	48,341	38,422	42,636	21,112	—	—	—	33,443
Central-station air handlers	55,200	58,630	51,260	53,621	47,591	48,616	52,371	52,441	60,266	60,836
Unitary air conditioners[3]	1,723,591	2,140,504	2,726,269	2,392,193	1,561,385	2,399,638	2,829,447	3,226,998	3,057,009	2,582,213
Unitary heat pumps (air-to-air)	74,943	80,937	104,267	119,983	160,485	320,043	536,558	371,436	646,926	529,605
Water-source heat pumps	—	—	—	—	—	—	—	—	—	48,783
Packaged terminal air conditioners	159,858	204,785	294,198	268,253	189,927	182,608	261,777	148,332	183,274	163,141
Room air conditioners	4,938,138	3,923,390	4,937,384	4,244,586	2,648,430	2,805,124	3,303,335	4,030,423	3,757,102	3,178,993
Centrifugal chillers[4]	3,993	3,775	3,875	4,496	4,647	2,994	2,977	2,975	3,141	4,200
Reciprocating chillers	9,214	9,258	10,126	11,130	9,279	7,114	8,665	9,003	9,695	11,147
Absorption chillers	1,302	1,155	2,222	1,087	740	571	588	470	392	279
Adsorption, open-type absorption	1,676	2,002	Combined	—	1,672	1,866	2,318	2,704	2,503	2,962
Cooling towers[2]	14,034	14,747	14,733	13,950	13,212	11,156	8,517	9,906	—	11,951
Evaporative condensers	1,711	1,928	3,276	3,112	2,764	2,094	2,299	2,453	3,263	2,881
Mobile vehicle air conditioners	5,348,262	5,851,080	6,462,307	6,891,353	9,137,453	11,978,679	9,459,535	9,074,932	7,651,198	5,844,328
Mobile air conditioners for trucks, agricultural, construction equipment	194,067	370,015	577,361	905,993	1,412,508	2,320,911	2,452,820	1,298,198	1,352,198	793,780
Mobile vehicle refrigeration systems[5]	62,309	60,645	68,992	67,494	63,864	70,836	76,536	70,731	76,395	60,646
Unit coolers[6]	160,201	148,623	192,766	186,312	161,287	195,738	197,975	194,905	187,434	175,371
Ice-making machines	112,811	132,278	121,245	124,075	128,288	187,887	165,106	194,049	218,827	216,214
Drinking water coolers	247,381	314,524	384,745	373,723	262,173	307,570	335,173	373,885	411,687	409,728
Dehumidifiers	331,208	439,963	730,427	645,287	525,407	502,141	351,188	477,692	728,148	734,738

Source: Bureau of the Census Current Industrial Reports MA-35M, Air Conditioning and Refrigeration Equipment, Including Warm Air Furnaces. [1] Excludes vertical stack types for 1977. [2] Withheld to avoid disclosing operations of individual companies. [3] See related story in Air Conditioning section. [4] Excludes open-type units in 1978, 1979, and 1980. [5] Excludes railway freight cars for 1974 and succeeding years. [6] Excludes floor mounted dry and spray types in 1979 and 1980.

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base period by the end of next year.

Sheet metal sales volumes are expected to drop during the first half of 1982, bottoming out at 105% of the base period. During 1983, however volume should increase to a level of 120% of the base quarter.

Plumbing also is experiencing a decline, which should end in the second quarter of 1982. From that point, the sales volume is expected to increase rapidly to 135% of the base period by the end of 1983.

NHAW members reported an average dollar sales increase of 5.07% when compared to the previous year's figures. The median increase was 3%. Canadian members reported an average increase of 9.82% and a median increase of 11.3%.

With 146 firms reporting, NHAW provides data for 12 regions. It does not estimate total dollar volume for all members, however.

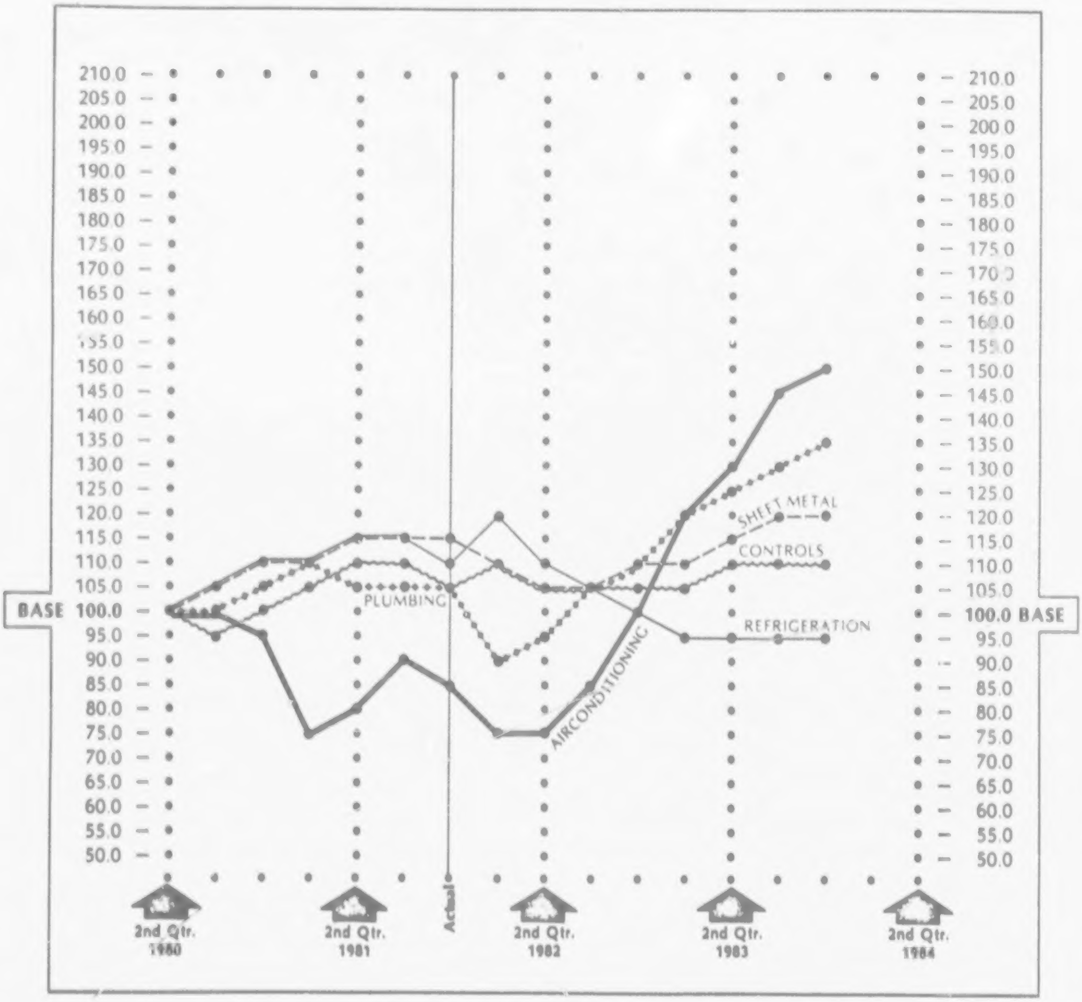
The greatest growth during the past year was in Region 3 (Delaware, Maryland, West Virginia, North Carolina, Kentucky, Tennessee, and District of Columbia), which experienced an average growth of 10.98% and a median growth of 10.85%.

The largest decrease was in Region 4 (Ohio, Michigan), with a 2.18% average decline and a median decline of 4.3%.

Percentage of dollar value potential for 1982 vs 1981

	Northeast	Southeast	Central	Southwest	West	Total	Canada
Unitary AC&H equipment (4 tons and under)	4.7	8.9	6.4	8.0	5.0	6.6	11.0
Unitary AC&H equipment (over 4 tons)	6.8	6.1	7.7	10.0	4.6	7.0	7.0
Refrigeration condensing units	13.2	5.9	7.5	7.0	2.2	7.2	8.0
Refrigeration coils	11.7	8.1	6.2	7.0	2.2	7.0	8.0
Replacement compressors	15.4	14.1	11.0	14.0	20.6	15.0	7.6
Refrigerant	7.2	11.7	2.5	12.2	6.3	8.0	9.0
Driers, strainers, filters, and sight glasses	6.5	14.0	8.5	13.6	11.8	11.0	8.0
Refrigerant flow controls — TEV, solenoid, and regulating valves, etc.	3.3	10.6	7.7	14.6	7.2	8.7	2.2
Pressure and temperature controls	3.4	12.1	8.0	9.2	12.3	9.0	8.0
Electrical controls — relays, contactors, and starters	5.1	10.1	7.6	7.2	15.6	9.1	7.8
Capacitors	6.8	11.5	7.0	10.8	12.5	12.0	8.0
Electric motors	6.6	13.0	4.3	9.2	10.0	8.6	1.5
Pipe and tubing fittings	11.6	5.6	2.8	7.6	.5	5.5	6.4
Pipe and tubing insulation	5.5	15.0	3.0	7.0	10.0	8.1	6.0
Grilles, registers, and diffusers	10.0	8.3	--	7.3	1.7	6.8	11.6
Sheet metal and fittings	--	4.5	--	7.3	--	3.9	20.0
Air filters and air cleaners	5.6	8.7	1.8	8.8	8.3	6.6	9.2
Water treatment and maintenance chemicals	4.0	.1	1.9	.2	10.0	3.2	9.0
Instruments and test equipment	5.1	5.4	7.0	2.5	10.0	6.0	7.0
Totals	**10.0**	**12.7**	**9.5**	**11.6**	**15.3**	**11.8**	**10.8**

1982 SALES FORECAST undertaken by members of the Air-conditioning and Refrigeration Wholesalers shows an overall gain of 11.8% in dollar volume over 1981. Regions within the five areas are: Northeast (Regions 1, 2, and 10); Southeast (Regions 3, 4, and 12); Central (Regions 5, 6, and 7); Southwest (Region 8); and West (Region 9). Percentages were weighted to the total annual sales volume of responding wholesalers.



1980 TO 1984 FORECAST has been deseasonalized and adjusted for inflation to reflect physical volume rather than dollars. The index of real growth is based on a sales level for the second quarter of 1980 equaling 100.

The replacement market

It was a year when, because of high unemployment and even higher interest rates, new residential construction was at its lowest ebb since World War II. The economy perked up a bit only to become ill again along about the fourth quarter.

Yet why, during 1981, did shipments of most of this industry's products hold their own, or even gain a bit? And why, in the face of more economic gloom and doom for 1983, can we look forward to continued strong performances this year?

The answer, clearly, was — and is — the replacement market.

With the exception of residential boilers, a victim of the gas conversion phenomenon, the replacement markets were strong in 1981. Gas furnace replacements were up 34%, oil furnace replacements were up

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Replacement market

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129% from a much smaller base.

Residential air conditioner replacements were up 48% and home heat pump replacements were up 22%. Commercial air conditioning and heat pump replacements held as steady as their new construction markets.

All are signs that the industry is moving to a point, probably three or four years away, when the influences of weather and of new housing starts will have much less effect than today. It will be brought about by changing fuel preferences and by a maturing air conditioning market that will generate as many replacements as new installations.

With this in mind, we have tried to take a look at some aspects of the residential and commercial replacement markets that, while far from scientific, does represent our best judgment.

Air conditioning

In the case of unitary air conditioning, the replacement market must be separated into three parts — commercial, heat pumps, and home comfort cooling.

If we subtract 442,829 heat pumps from the 2,166,714 unitary air conditioners shipped in 1980, we get 1,724,000 comfort cooling units — 345,000 (20%) commercial and 1,380,000 (80%) residential. Of the commercial units shipped, The News estimates that 255,000 (74%) went into new construction and 90,000 units (26%) were commercial replacements.

Of the 1,380,000 residential air conditioners shipped in 1980, we estimate 828,000 (60%) went into new single- and multifamily homes; 262,900 (19%) were replacement units; 221,000 (16%) were add-on units; 41,500 (3%) went into mobile homes; and 27,500 (2%) were mobile home replacement units.

From the 1981 total unitary shipments of 2,367,483 we must subtract 504,786 heat pumps and 124,000 air conditioners added to inventory last year and not sold (another 50,000 inventory units are included in the heat pump figures). This brings the total comfort cooling units to 1,738,697 — of which 348,000 (20%) were commercial and 1,390,000 (80%) were residential.

Of the commercial units shipped, we estimate that 257,500 (74%) went into new construction and 90,500 units (26%) — virtually the same as for the previous year — were commercial replacement units.

Of the 1,390,000 residential air conditioners shipped in 1981, we estimate 709,000 (51%) went into new single- and multifamily homes; 389,000 (28%) were replacement units; 225,500 (16%) were add-on units; 41,700 (3%) went into mobile homes; and 27,800 (2%) were mobile home replacements.

The increase in the residential air conditioner replacement market, then, was 48%. Some of the increase, to be sure, comes from the growing inventory of aging units. For more than a decade, the industry has been adding residential central air conditioning units, both new and replacements, at an annual rate of 1.2 million units.

The surge in replacements last year, we feel, came from three directions. Some owners of older and less efficient equipment decided on their own to replace their unit in order to reduce operating costs. Some were prompted by utility energy audits

Our unofficial estimates of unitary market shares

When it comes to figuring the shares of the unitary air conditioning market held by individual manufacturers, we must rely on "feel" rather than reliable numbers. There are no reliable numbers.

Each year, too, the percentages shift a bit as companies enter or leave the market, one company is acquired by another, or distribution-product-promotion improvements are reflected in the marketplace.

And like all national figures, they don't give a clear picture of market shares in any specific city or area of the country. In fact, some of the essentially regional manufacturers, with a small national share of the market, often are among the leaders in those areas where their distribution is concentrated.

Another distortion comes from the interest of the reader. Whether a particular manufacturer is strong in the new-home or the add-on market makes little difference to many. But to a contractor who specializes, the list of competitive brands can expand or contract according to his interests — and change when his emphasis changes.

Because of these and other situations within their own cities, contractors often get a distorted view of national market shares. For them, and for researchers and others not deeply involved in the air conditioning industry, The News offers these educated guesses of unitary equipment market shares in units:

Carrier (including Bryant, Day & Night, Payne) — 22%
Lennox — 13%
Rheem-Ruud — 13%
General Electric — 12%
Whirlpool, Heil-Quaker — 8%
York — 6%
Fedders, Magic Chef (Johnson, Air-Ease, Williams, Armstrong, Gaffers & Sattler), Trane — 2% each.

The list adds up to more than 80% of the unitary market. The real difficulty comes in attempting to rank those manufacturers with a 1%, 2%, or 3% market share. It must be remembered, too, that 2% of a 2.5 million market means annual shipments in the order of 50,000 units.

and others were encouraged by electric utility rebates amounting to as much as $60/ton for units with an SEER (seasonal energy efficiency ratio) of at least 8.5 and $120/ton for units with an SEER of at least 10 (see Comfort in Construction).

Looking ahead to 1982, we think that residential replacement shipments, at 383,000, will continue at 1981's rapid pace but not show an increase. The principal reason for not forecasting another big growth year is contained in the prospect for interest rates.

For the record, we forecast there will be 1,850,000 unitary air conditioners shipped in 1982 (2,350,000 units less 500,000 heat pumps) and that 370,000 (20%) will be commercial and 1,480,000 (80%) will be residential. Of the commercial units, 273,800 will go into new construction and 96,200 will be replacements.

Of the 1,480,000 residential units, 830,000 (56%) will go into new single- and multifamily homes; 383,000 (26%) will be replacements; 193,000 (13%) will be add-on units; 44,400 (3%) will go into mobile homes; and 29,600 (2%) will be mobile home replacements.

Commercial replacement air conditioners, which remained level during 1980 and 1981, should increase by 6% this year to 96,200 units. Mobile home replacements have remained stable at 28,000 to 29,000 units.

Add-ons

The add-on market, which once led replacement by a wide margin, was estimated at about 16% of residential air conditioner shipments in 1980 and 1981. We are forecasting that this proportion will drop to 13%, or 193,000 units, this year.

In prior years, the number of add-on units tended to increase in years with few housing starts as people opted to fix up their present homes rather than buy new ones. However, today's high interest rates have affected both new construction and add-on sales equally.

Replacement sales escape the specter of high interest rates to a much greater degree because they are usually prompted by necessity (a major failure) or by a desire to lower operating costs on the part of people who have the means.

We rather suspect, too, that as many or more add-on units come from furnace replacements and upgrading today as there are furnace replacements caused by the fact the present unit cannot handle the add-on air conditioning evaporator coil.

Heat pumps

Of the 442,829 heat pumps shipped in 1980, we estimate 88%, or 389,000 units, were for residential applications and 12%, or 54,000 units, were for commercial applications. Of the commercial units, 44,300 (82%) went into new construction and 9,700 units (18%) were replacements.

Of the residential heat pumps shipped in 1980, some 293,000 (75%) went into new single- and multifamily homes; 43,000 (11%) were add-on units; 49,000 (12.5%) were replacements; and 4,000 (1%) went into mobile homes.

In 1981, the 504,786 units shipped must first be reduced by 50,000 units added to inventory but not sold. This leaves 454,786 units, of which 54,500 (12%) were commercial and 400,000 (88%) were residential. Of the commercial units, 44,700 (82%) went into new construction and 9,800 units (18%) were replacements.

Of the residential units shipped last year, 260,000 (65%) went into new single- and multifamily homes; 72,000 (18%) were add-on units; 60,000 (15%) were replacements; and 4,000 (1%) went into mobile homes.

It might be noted that, while commercial replacements stayed about the same, residential replacements increased by 22% from 49,000 units in 1980 to 60,000 units last year. Another 1,000 commercial replacements, to 10,800 units, and a 10% increase in residential heat pump replacements is expected this year.

The add-on category, which increased by 67% from 43,000 units in 1980 to 72,000 units in 1981, is expected to increase by another 11% this year to 80,000 units. The reason (see Comfort in Construction) is a growing market of replacing existing air conditioners, particularly on electric and oil furnaces, with heat pumps in order to effect savings in operating costs during relatively mild weather.

Boilers

Of the 372,974 residential boilers shipped in 1980, only an estimated 40,300 went into new single- and multifamily homes. The other 332,700 units, 85% of them gas-fired and 15% oil-fired, were replace-

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	4 years or less	4 - 10 years	11-20 years	20 - 40 years	41 years or more	Don't know	No response
U. S. total 34,600,000 homes	17.0%	29.7%	28.9%	14.1%	1.1%	5.6%	4.7%
New England 2,060,000 homes	11.6	24.7	32.5	20.2	3.0	5.3	2.7
Mid Atlantic 5,581,000 homes	10.8	24.2	32.4	20.3	1.7	5.8	4.8
E. North Central 7,497,000 homes	15.5	30.0	31.7	13.3	1.0	5.8	2.7
W. North Central 2,926,000 homes	17.0	27.7	30.1	17.1	1.6	3.9	2.6
S. Atlantic 4,988,000 homes	21.0	36.6	23.9	8.5	1.0	4.5	4.5
E. South Central 1,925,000 homes	21.0	33.9	24.4	7.0	*	5.7	8.0
W. South Central 3,091,000 homes	24.8	35.1	25.9	5.9	*	6.2	2.1
Mountain 1,714,000 homes	21.5	34.5	27.4	10.1	1.5	4.7	0.3
Pacific 4,897,000 homes	16.7	25.5	28.0	18.9	1.3	7.2	2.4

* less than 1%

Source: Bureau of the Census, 1977 Housing Survey

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ments.

Last year the gas conversion phenomenon, which caused a large deviation in boiler shipment figures, was mostly over.

In 1981, a total of 27,300 of the 251,022 residential boilers shipped went into new single- and multifamily homes. The remaining 223,700 units, now about 70% gas-fired and 30% oil-fired, were replacements.

Furnaces

Of the 63,400 oil furnaces shipped in 1980, a total of 33,500 units went into new single- and multifamily homes. The remaining 29,900 were replacements.

Similarly, a total of 12,600 of the 81,200 oil furnaces shipped last year went into new single- and multifamily homes. The remaining 68,600 units, or an increase of 129%, were replacements.

A slowing of the rate of conversions from oil to gas, due in large measure to fears of gas price increases following decontrol, and a desire for higher efficiencies, were the principal reasons for the increase.

Fuel Oil/Oil Heat and Solar Systems magazine estimated that close to 80% of the 549,000 replacement oil burners shipped last year were retention-head or other high-efficiency types.

Of the 1,445,100 gas furnaces shipped in 1980, a total of 450,000 went into new single- and multifamily homes, 383,000 were conversions from other fuels, and 612,000 were replacements.

Similarly, the 1,416,700 gas furnaces shipped last year included 395,000 for new single- and multifamily homes, 200,000 for conversions, and 822,000 were replacements, a 34% increase over the previous year despite the substantial drop in conversions.

New high-efficiency gas furnaces coming into the market are expected to swell the replacement figures over the next few years. On the other side of the ledger, however, conversions from other fuels are expected to decline, possibly to 150,000 units or a bit below.

Conversions from other fuels to oil, at 10,000 in 1980, improved slightly to 11,000 last year. Replacement electric furnaces, together with conversions to electric from other fuels, are not recorded and are thought to be negligible.

A supplementary study conducted in 1977 by the Bureau of the Census and uncovered in 1980 suggests a national replacement market of 5.3 million single-family home heating systems which are 20 years old or older.

Nationally, 17% of the systems were 4 years old or less; 29.7% were between 4 and 10 years old; 28.9% were between 10 and 20 years old; 14.1% were between 20 and 40 years old; and 1.1% were more than 40 years old.

Contained in this Statistical Panorama is a breakdown of the heating system age statistics by region (on this page) and a 40-city breakdown contained on the pages dealing with each of those cities.

International

The air conditioning and refrigeration industry, a long time contriutor to the nation's positive balance of trade, continued to increase that contribution in 1981 despite sluggish domestic and world economies and a substantial increase in imports. The primary reason has been an expanding export market, which has increased by 92% since 1976.

The total value of U.S. exports, according to the U.S. Department of Commerce, was $2,073 billion, or 11.3% more than the $1.863 billion recorded in 1980. At the same time there was an 18.7% increase in the value of air conditioning and refrigeration equipment imported into the United States. Imports in 1981 totaled $273.8 million, up from $230.7 million in the previous year and $250 million in 1979.

The difference in scale is readily apparent. Imports represented only 13.2% of exports last year, a slight increase from 12.4% in 1980.

Looked at in this way, the positive balance of trade generated by the air conditioning and refrigeration industry amounted to $1.8 billion in 1981, an increase of 10.2% over the $1.63 billion generated in 1980. This represents only shipments and does not take into account the profits to U.S. companies from subsidiaries, joint ventures, and licensing agreements which are not invested abroad.

The outlook for 1982 is for an increase in exports in the order of about 10% — essentially a flat market in terms of units — and an increase in imports of about 20%, reflecting an increase in Japanese compressors and, to a much smaller degree, in unitary heat pumps and air conditioners.

Imports

According to Department of Commerce figures, four nations accounted for $233 million of the $273.8 million worth of air conditioning and refrigeration equipment imported into the United States last year. The four:

- $139.3 million from Japan, up 29.5% from 1980, which mostly included 379,000 compressors of less than 1 hp, 872,000 compressors of from 1 to 3 hp, 628,000 compressors of from 3 to 10 hp, 62,000 nonroom air conditioners, 19,000 absorption-type refrigerators, and $32 million in air conditioning machine parts. Most of the compressors in the 1- to 10-hp range are believed to be for automotive air conditioners. Similarly, the nonroom air conditioners are believed to be mostly automotive air conditioner kits.
- $43.9 million from Canada, up 13%, mostly including 27,700 room air conditioners, 12,000 unitary air conditioners, 19,000 absorption-type refrigerators, and 15,500 freezers.
- $27 million from Italy, up 30%, mostly including 453,000 compressors of less than 0.25 hp, 207,000 compressors of from 0.25 to 1 hp, and 16,000 freezers.
- $23 million from Singapore, up 65%, which mostly included 693,000 compressors of less than 0.25 hp.

Of the remainder, the U.S. imported $9.8 million worth of air conditioning and refrigeration equipment (mostly made up of 208,000 compressors of less than 0.25 hp) from West Germany; $6 million worth from Mexico (mostly 6,000 absorption-type refrigerators, down 36%); and $5 million worth from Sweden (mostly 33,000 absorption-type refrigerators, down 70%).

In all, the U.S. imported $144.8 million worth of compressors last year, up from $98 million in 1980; $25 million worth of unitary air conditioners, of which $14 million probably represented misclassified automotive kits; $24 million worth of refrigerators and freezers; and $48 million worth of air conditioning machine parts.

Top markets

In terms of products exported, the Commerce Department's Bureau of the Census prepares country-by-country breakdowns for most of the product categories listed in the 10-year look at U.S. industry shipments found elsewhere in this issue. In most cases it lists the number of units shipped and their total dollar value.

Although we do not have the space to reprint the complete breakdown, a feel for the top export markets in 1981 can be gained by looking at the top customer countries for key products and expressed in numbers of units. Here are a few:

- **Compressors of 3 hp and less** (1.2 million units total): Canada 317,000; Brazil 86,000; Saudi Arabia 187,000; Venezuela 39,000; Argentina 24,000; Japan 104,000; Thailand 34,000; Singapore 27,000; Malaysia 24,000; Nigeria 68,000; and South Africa 12,000.
- **Compressors of 3 hp to 10 hp** (567,000 units total): Canada 421,000; Belgium 14,000; Mexico 27,000; Venezuela 26,000; Australia 19,000; and Japan 9,000.
- **Compressors of more than 10 hp** (47,000 units total): Canada 5,700; Venezuela 1,600; Spain 2,400; Mexico 1,000; United Kingdom 1,800; France 4,400; Saudi Arabia 9,800; Bahrain 3,000; Malaysia 1,200; Hong Kong 1,100; Kuwait 1,200; and Australia 1,800.
- **Ammonia compressors** (1,800 units total): Canada 131; Ecuador 140; Saudi Arabia 378; and Mexico 145.
- **Automotive air conditioners and parts** ($246 million total): Canada $147 million; Panama $1.2 million; Venezuela $3.9 million; Brazil $2.8 million; Ireland $8.6 million; West Germany $33.7 million; Mexico $4.8 millions; United Kingdom $6 million; France $3.8 million; Australia $5 million; Japan $2.9 million; and Saudi Arabia $2.2 million.
- **Room air conditioners** (713,000 units or 19.3% of U.S. production): Saudi Arabia 254,000; Kuwait 58,000; Hong Kong 50,000; Libya 48,000; Arab Emirates 44,000; Nigeria 42,000; Mexico 18,000; Venezuela 17,000; South Africa 12,000; Iraq 13,000; Argentina 11,000; Canada 8,800; and Australia 5,700.
- **Split-system heat pumps** (29,000 units total): Canada 15,500; Spain 1,100; Iraq 1,400; Australia 3,900; and Saudi Arabia 1,100.
- **Unitary heating-cooling single packages** ($50.5 million total): Saudi Arabia $13.2 million; Canada $12.2 million; Mexico $3.4 million; Arab Emirates $2.1 million; Iraq $2.5 million; and Switzerland $1.4 million.
- **Self-contained air conditioners under 5 tons** (50,000 units total): Canada 8,400; Venezuela 4,100; Suadi Arabia 9,800; Hong Kong 2,300; Libya 6,000; Taiwan 1,300; and Egypt 1,400.
- **Self-contained air conditioners over 5 tons** (16,000 units total): Canada 3,200; Venezuela 1,000; Kuwait, 1,000; and Saudi Arabia 2,000.
- **Unitary split-system air conditioners under 5 tons** (78,000 units total): Canada 10,500; Colombia 12,000; Mexico 1,100; Venezuela 4,400; Lebanon 2,600; Saudi Arabia 15,500; Australia 2,200; Kuwait 4,100; Hong Kong 3,500; and Sudan 4,000.
- **Unitary split-system air conditioners over 5 tons** (11,000 units total): Canada 950; Venezuela 1,000; Saudi Arabia 1,400; Arab Emirates 1,600; Egypt 600; and Australia 500.
- **Central station air handlers** (13,800 units total): Venezuela 2,800; Saudi Arabia 2,700; Egypt 1,100; Hong Kong 900; and Kuwait 650.
- About half as many **centrifugal chillers** were sent abroad in 1981 as were manufactured for the domestic market. The 1,673 export units, including both open and hermetic types, went to such places as Canada (246), Saudi Arabia (195); Taiwan (151); and Hong Kong (131).
- In a similar vein, there were more **absorption chillers** (343) manufactured in the U.S. for export than there were for domestic markets. Brazil used 106 of them while

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Major export markets

U.S. air conditioning, refrigeration equipment (values in millions)

Market	1977		1978		1979		1980		1981	
	Value	% of total	Value	% of total	Value	% of total	Value	% of total	Value	% of total
Canada	232.6	18.3	298	21	307	19	310	17	401	19
Central, South America	164.1	12.9	170	12	242	15	262	14	363	18
Western Europe	195	15.4	198	14	242	15	320	16	315	15
Far East	108.6	8.5	184	13	242	15	289	16	314	15
Middle East	352.8	27.8	397	28	404	25	457	25	506	24
Africa	86.5	6.8	85	6	81	5	117	6	164	8
Other	130.4	10.3	85	6	97	6	108	6	10	1
Total	**1,269.8**	**100**	**1,417**	**100**	**1,615**	**100**	**1,863**	**100**	**2,073**	**100**

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36 went to Italy, 26 to Canada, and 20 each to Indonesia and West Germany.

- **Reciprocating liquid chilling packages** (4,500 units total): Hong Kong 649; Canada 466; Saudi Arabia 890; and Abrab Emirates 265.
- Of the $523 million in **air conditioning and refrigeration parts** exported in 1981, Saudi Arabia accounted for $88 million, Canada $69 million, France and Nigeria $22 million each, and Iraq $21 million.

Fuels and energy

United States energy consumption in 1981 was 74.42 quadrillion Btu (quads), about 2.5% less than the revised year-previous total of 76.3 quads and 5.8% below the 1979 total of 78.97 quads, according to the U.S. Department of Energy.

The total energy consumed in the U.S. last year was just a bit below the consumption level of 1973, the year of the Arab oil embargo.

In the residential and commercial sector, the 26.446 quads consumed last year was 2.1% below the levels of both 1980 and 1979. In 1981, this sector represented a 35.5% share of the total, down from 38.2% in 1980.

Industrial sector consumption amounted to 29.269 quads last year, 3.1% from the 30.207 quads consumed by this sector in 1980 and down 6.8% from the 1979 level. The 1981 industrial consumption figure was 39.3% of the total, up from 37.4% in 1980.

Consumption in the transportation sector in 1981 totaled 18.654 quads, down 2% from the 19.052 quads consumed in the previous year and down 8.7% from 1979 levels. The 1981 total represented 25% of the total consumption, up a hair from the 24.4% share in 1980.

Electric utilities consumed an estimated 24.8 quads of energy in 1981, about the same as in the previous year, and 2.6% higher than in 1979. Of utility energy consumed, 51% was coal, 15.1% was natural gas, oil was 9.9%, hydroelectric power was 11.7%, nuclear power 11.7%, and geothermal, wood, and waste 0.5%.

Of the 26.446 quads used last year in the residential and commercial sector, 0.62% was coal, 27.9% was natural gas, 14.5% was oil, 16.5% was electricity sold and 40.4% was represented by electrical generation and transmission losses.

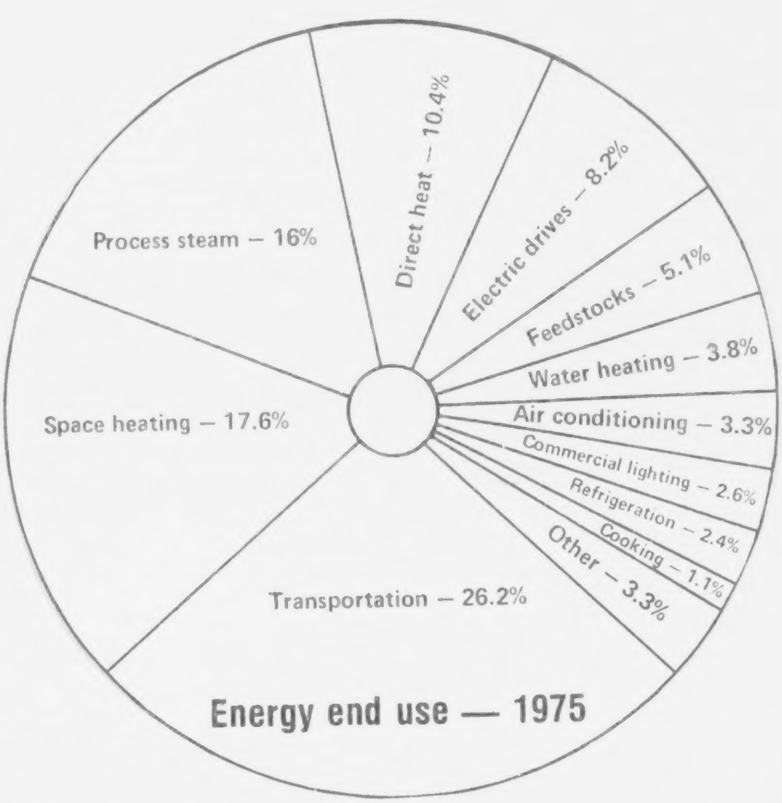
Similarly, the 29.269 quads used by the industrial sector last year breaks down this way: 11% coal, 28.9% natural gas, 26.7% oil, 0.1% hydroelectric, 9.6% electricity sold, and 23.58% was represented by electrical generation and transmission losses.

Fuel costs

A two-year tally of fuel prices prepared by the U.S. Department of Labor as part of the cost-of-living index shows that, from December, 1980, to December, 1981, fuel oil prices nationally increased from $1.022 to $1.247/gal.

During the same period, natural gas rose from $41.60 per 100 therms to $46.369 per 100 therms. The prices going into 1982 in the west were $36.201 per 100 therms and, in the northeast, $61.246 per 100 therms.

Similarly, the cost of 500 kWh of electricity nationally increased during the same period from $30.50 to $34.96. The range extended from $32.343 in the west to $46.628 in



Energy end use — 1975

the northeast.

Electricity

An increase of 0.7% in electric output in the United States was reported by the Edison Electric Institute. Total net electricity for distribution in 1981 was 2,333.7 trillion kWh compared to 2,318.2 trillion kWh in 1980.

Peak power demand in the U.S., including Alaska and Hawaii, was forecast at 392,257 megawatts for the winter of 1980-1981 by the Federal Power Commission. This compares to a winter peak of 409,624 megawatts for the winter for 1981-1982.

The forecast for the summer of 1982 is 458,926 megawatts, up 3.9% from the comparable figure of 441,656 megawatts in the summer of 1981. The outlook for the winter of 1982-1983 is for a peak of 409,624 megawatts.

Total kWh sales in 1981 increased by 0.9%, the same as the year-previous increase, from 2,092,717,507 thousand kWh in 1980 to 2,111,898,693 thousand kWh in 1981. Commercial sales, at 522,993,409 thousand kWh, were up 2.8%; industrial sales, at 795,369,471 thousand kWh, were up 0.6%; and residential sales, at 716,471,069 thousand kWh, were down 0.4%.

Installed capacity in all 50 states in 1981 was 631,500 thousand kWh, a 3.5% increase over the 610,392 thousand kWh installed capacity in 1980. The total number of customers increased by 1% during the same period from 91,441,000 in 1980 to 92,444,000 in 1981.

Nuclear

During November, 1981, operating domestic nuclear power reactors generated a total of 22.8 billion net kWh electricity, 10% above the October, 1981, output and 8.6% above the November, 1980, experience. Nuclear power accounted for 13% of all U.S. commercial electricity generation in November, 1981.

Through the first 11 months of 1981, the average of 75 reactors licensed for commercial operations were generating from 19,723 million net kWh/month to 26,946 million net kWh/month, about 2% less than for the same period in the previous year. The capacity factor in 1981

TURN TO PAGE 131

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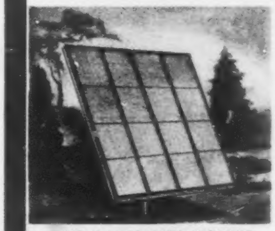

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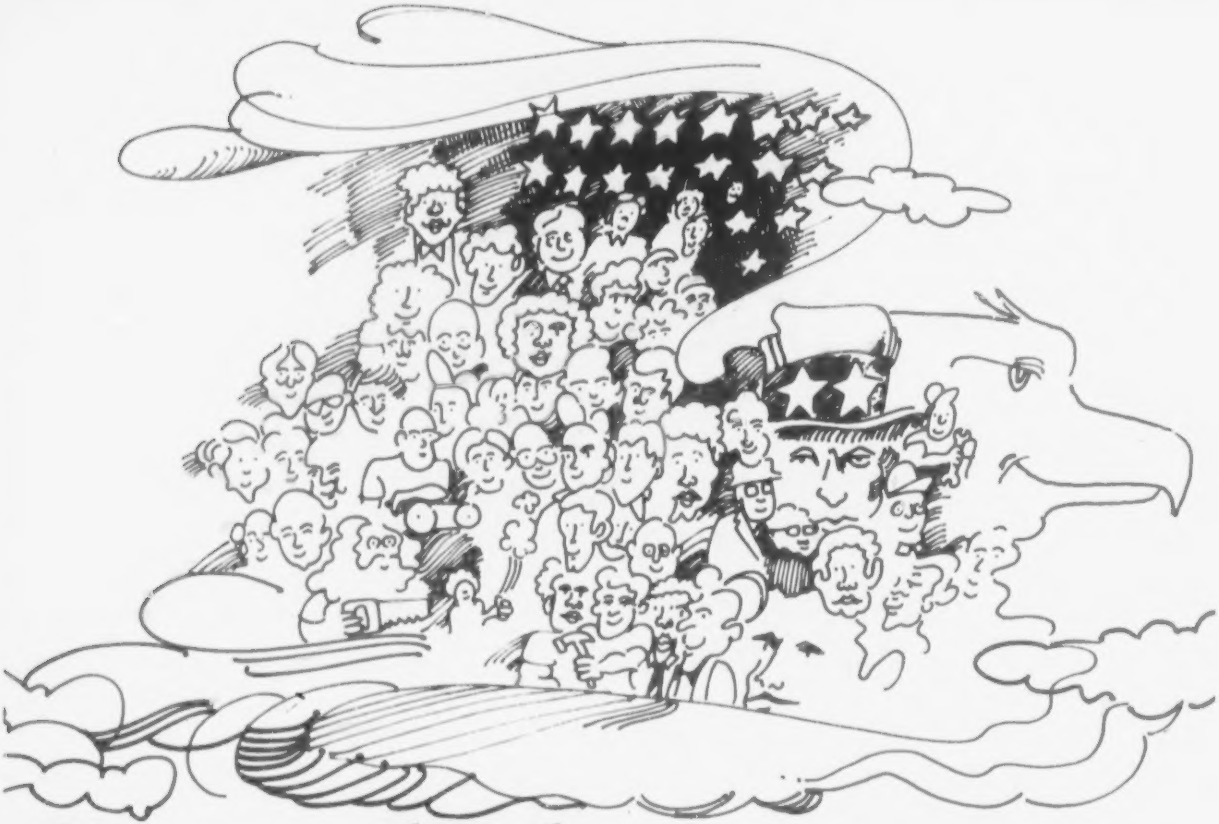

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averaged 54.8%, just 1% more than in 1980.

At the end of 1981, there were 74 licensed reactors. Construction permits were granted for 78 more, construction permits are pending on 11, and reactor units are ordered for four more. No new reactors have been announced since 1978.

Nuclear electricity generation, in terms of billions of gross kWh, in the U.S. through 11 months last year amounted to 261.1. This compares to 397.3 for the total noncommunist world excluding the U.S. Some of the biggest users of nuclear power include Japan with 77.9, West Germany 48, United Kingdom 34, Canada 39.2, Sweden 33.6, Belgium 11.5, and Finland 13.3

Natural gas

Gas utility thermal equivalent sales totaled 15,482.8 trillion Btu in 1981, an increase of 1.07% over the 15,318.3 trillion Btu sold the previous year, according to the American Gas Association (AGA). The increase from 1978 to 1979 amounted to 7.2%.

Industrial sales, which represent just over 50% of the total, increased by 5.8% from 7,723 trillion Btu in 1980 to 8,170.9 trillion Btu in 1981. Residential sales, which represent about 30% of the total, dropped by 4% from 4,853.4 trillion Btu in 1980 to 4,657.5 trillion Btu in 1981. Commercial sales, representing 15% of the total, declined by 2.4% from 2,431 trillion Btu in 1980 to 2,374.4 trillion Btu in 1981.

AGA reported that average national gas utility prices, expressed in dollars per million Btu, for 1972 were: all $0.73; residential $1.19; commercial $0.91; industrial $0.45; and other $0.41. Preliminary prices for 1981 were: residential $4.29; commercial $3.72; and industrial $3.43.

Coal

U.S. coal production in 1981, at 805 million tons, was down 2.6% from the 823.6 million tons produced a year earlier, according to the National Coal Association. NCA forecast that production this year would increase by 10% to 886 million tons.

Coal production was depressed in 1981 because of a 72-day strike by the United Mine Workers. Despite the strike, however, coal consumption in the U.S. last year totaled 738 million tons, up 5.6% from the 699 million tons consumed in 1980. The outlook for 1982 is for a 4.6% increase in consumption to 772 million tons.

The sharpest upturn in coal production in 1982 will come in mines east of the Mississippi river, which will show a 12% increase to 593 million tons. Largely because of the strike, eastern coal production in 1981 amounted to only 530 million tons, down 7.4% from the 1980 total of 572.6 million tons.

Largely unaffected by the UMW strike, western coal production grew from 251 million tons in 1980 to 275 million tons last year, a 9.6% increase. Another 6.6% is expected this year to 293 million tons.

Foreign shipments continue strong. Total exports increased by 5.6% last year, from 89.9 million tons in 1980 to 95 million tons in 1981 and are expected to increase by 10.5% this year to 105 million tons. That would be a 62% increase over 1979's level of 64.[illegible] million tons.

The electric utility industry continues to be the largest consumer of U.S. coal, accounting for 80% of domestic consumption. Utilities consumed 596 million tons in 1981, up 5% from the 568.3 million tons consumed the previous year. Coal-fired power plants supplied 52.4% of the nation's electricity in 1981, the highest level since 1967.

The growth of electric utility coal use, at an expected 4% in 1982 to 620 million tons, will be lower in future years because most of the coal-fired power plants now are being operated at full capacity. Growth will have to come from new coal-fired plants and from a few conversions from oil to coal.

The use of coking coal by the steel industry is expected to increase to 72 million in 1982, up 10.8% from the depressed levels of 65 million tons in 1981 and 66.5 million tons in 1980.

Foreign demand for steam coal, used in industrial and power plants, soared following the 1979 price increase by the Organization of Oil Exporting Countries (OPEC). Steam coal shipments to overseas custom-

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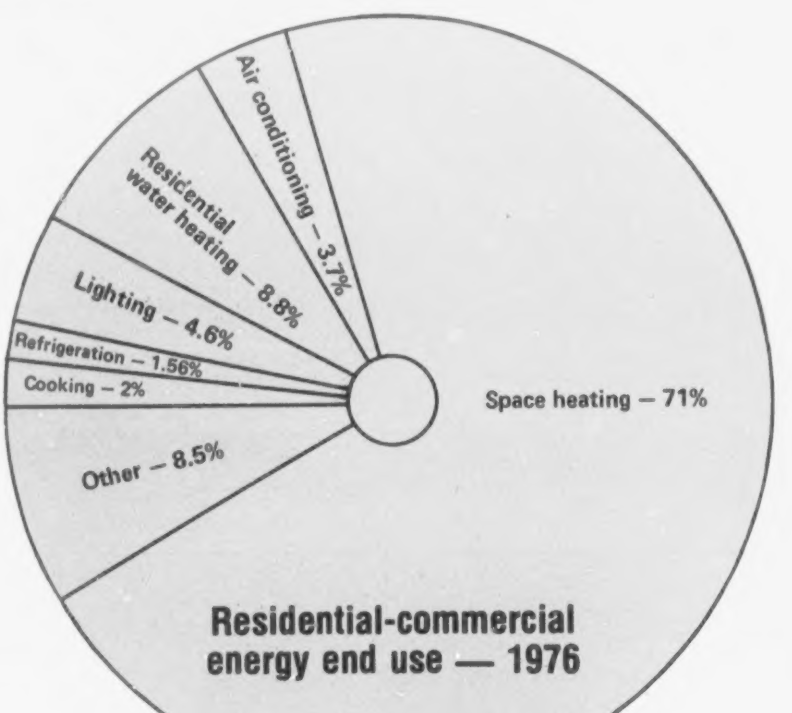

Residential-commercial energy end use — 1976

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ers rose from near zero in 1978 to 31 million tons last year and a forecast 36 million tons in 1982.

Overseas demand for metallurgical coal declined from 56.8 million tons in 1980 to 49 million tons last year, principally because the Japanese regained access to Australian supplies cut off by strikes in 1980.

The sharp increase in demand for export coal has taxed the loading facilities at U.S. ports, however. Over the past 18 months, the use of loading facilities designed for other bulk commodities, the use of barge-to-ship loading, the use of older piers, and advanced vessel registration systems have raised export capacity to 120 million tons annually. More permanent solutions are under construction.

Meanwhile, the coal industry is fighting cargo preference legislation now before Congress which would require 40% of coal exports to be carried in U.S. owned and operated ships. It claims the resulting added cost of $34 to $50/ton would eliminate the export market.

Imports

Net energy imports into the United States declined by 22% last year from a revised figure of 12.234 quads in 1980 to 9.514 quads in 1981.

Net imports decreased for all types of energy except electricity, which remained constant, and coking coal, which increased. The largest change was in crude oil and refined petroleum products, which fell 15.4% to 11.4 quads. Natural gas imports declined 12.3% to 0.8 quads and net exports of coal rose 20.8% to 2.9 quads.

Crude oil and petroleum products imports (excluding the strategic petroleum reserve) averaged 5.7 million barrels per day, a 16.6% decrease from 1980 experience and the lowest level since 1972.

Energy production in the United States in 1981 dropped 0.3% to 64.4 quads, just a hair below the all-time high established in 1980. Declines of 2.4% in coal production and 0.3% in petroleum production were more than offset by the 1.4% increase in natural gas production and a 0.8% increase from other sources.

World crude oil production declined for the second year in a row from a record 62.7 million barrels a day in 1979. Production averaged approximately 55.9 million barrels a day in 1981, primarily because of production declines in Algeria, Iraq, Kuwait, Libya, Iran, Nigeria, and Canada.

Total U.S. consumption of energy declined for the second year in a row to 74.4 quads, a 2.2% drop from 1980 levels. Petroleum consumption dropped 6.1% to 32.1 quads, natural gas dropped 1.1% to 20.2 quads, hydroelectric power dropped 5.8% to 2.9 quads, while coal consumption increased by 3.6% to 16.1 quads and

TURN TO NEXT PAGE

Solar applications according to end use

FIGURES are in thousands of square feet.

Year and Collector Type	Pool Heating	Hot Water	Space Heating	Space Cooling	Industrial Processing	Agricultural Processing	Other	Total Reported Distribution
1980								
Low-Temperature, Nonmetallic..	9,353	24	1	1	139	9	1	9,528
Low-Temperature, Metallic.....	1,956	622	76	1	48	0	0	2,703
Medium-Temperature, Air.......	6	27	587	1	1	17	9	648
Medium-Temperature, Liquid....	695	3,975	959	R74	132	28	159	6,022
Special, Concentrator.........	2	106	21	25	54	0	117	325
Special, Evacuated Tube.......	1	35	41	R55	3	0	R9	114
Other.........................	15	1	0	0	0	0	8	24
Total	12,029	4,790	1,688	R156	377	54	302	19,394
1979								
Low-Temperature, Nonmetallic..	6,743	20	23	15	69	59	18	6,946
Low-Temperature, Metallic.....	1,119	78	27	5	26	0	193	1,447
Medium-Temperature, Air.......	3	40	776	0	0	21	5	846
Medium-Temperature, Liquid....	684	2,658	787	44	83	42	164	4,462
Special, Concentrator.........	3	140	77	10	32	0	4	269
Special, Evacuated Tube.......	0	13	30	155	22	0	8	229
Other.........................		9		3	1	40	3	57
Total	8,551	2,958	1,722	232	233	163	393	14,251
1978								
Low-Temperature, Nonmetallic..	4,667	71	65	1	NA	NA	2	4,894
Low-Temperature, Metallic.....	906	31	30	6	NA	NA	6	978
Medium-Temperature, Air.......	4	176	519	11	NA	NA	3	723
Medium-Temperature, Liquid....	391	2,164	979	71	NA	NA	52	3,668
Special, Concentrator.........	1	52	89	32	NA	NA	34	225
Special, Evacuated Tube.......	0	16	64	57	NA	NA	8	141
Other.........................	NA	NA	NA	NA	NA	NA	NA	NA
Total	8,251	2,513	1,736	179	82	47	139	10,635

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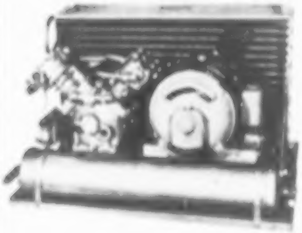

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energy from nuclear and other sources increased by 9% to 3 quads.

Exploration

Exploration for petroleum and natural gas in the United States again was at record levels in 1981. The December, 1981, rotary rig count of 4,520 was the highest in U.S. history — 1.9% higher than the record set the month before and 37.6% higher than the December, 1980, count of 3,286 rotary rigs.

The cumulative oil well completions in 1981 (37,639) were up 39.3% over the 27,026 completions reported in 1980. Also in 1981, there were 17,870 gas wells completed, up 13.6% from the 15,730 wells completed in 1980. Footage drilled during 1981 totaled 361 million feet, a 26.9% increase over the 1980 level.

Solar

The U.S. Department of Energy (DOE) reported that, in 1974, a total of 45 manufacturers shipped 1,274,000 ft^2 of solar collectors, of which 89% were low-temperature types and 11% were medium-temperature and special types. In 1977 a peak number of 297 manufacturers shipped 4,743,000 ft^2 of low-temperature and 5,569,000 ft^2 of medium-temperature collectors for a total of 10,312,000 ft^2, an increase of 78% over the previous year.

According to DOE, the production of collectors rose only 5% in 1978 to 10,860,000 ft^2, of which 54% were low-temperature and 46% were medium-temperature. In 1979, total production increased by 31% to 14,251,000 ft^2, of which 59% was low-temperature and 41% was medium-temperature.

The latest full-year figures are for 1980 when 276 manufacturers shipped 19,395,000 ft^2 of collectors, a 36% increase over 1979 performance. Of this, 12,230,000 ft^2 (63%) were low-temperature collectors and 7,165,000 ft^2 (37%) were medium-temperature collectors.

Shipment totals for the first half of 1981, at 10,822,000 ft^2, increased 21% from the comparable figure of 8,917,000 ft^2 shipped during the first half of 1980. This came despite a 9% drop in low-temperature collector shipments to 5,521,000 ft^2. Medium-temperature collector shipments increased by 86% for the same six-month period from 2,851,000 ft^2 to

5,301,000 ft².

The split for the shipments during the first half of 1981 was 51% low- and 49% medium-temperature collectors. (Low-temperature collectors generally operate at temperatures below 110°F. Medium-temperature collectors generally operate in the 140° to 180° range but can operate at temperatures as low as 110°. Special collectors include evacuated tube and concentrating types.)

Looking at the same six-month 1981 period, the U.S. imported 71,522 ft² of collectors (57% medium-temperature and 43% low-temperature). This is a 25% drop from the 95,288 ft² imported in the comparable half of 1980.

Also in the first half of 1981, the U.S. exported 495,571 ft² of collectors (87.5% of it low-temperature). This compares to the revised figure of 548,636 ft² exported in the same period of 1980, or a decrease of 9.6%.

In terms of end uses, most applications in 1980 (62%) were for swimming pool heating. The next biggest use (25%) was for domestic hot water heating. The remainder: space heating 8.7%; space cooling 0.8%; industrial processing 2%; and agricultural processing 0.3%.

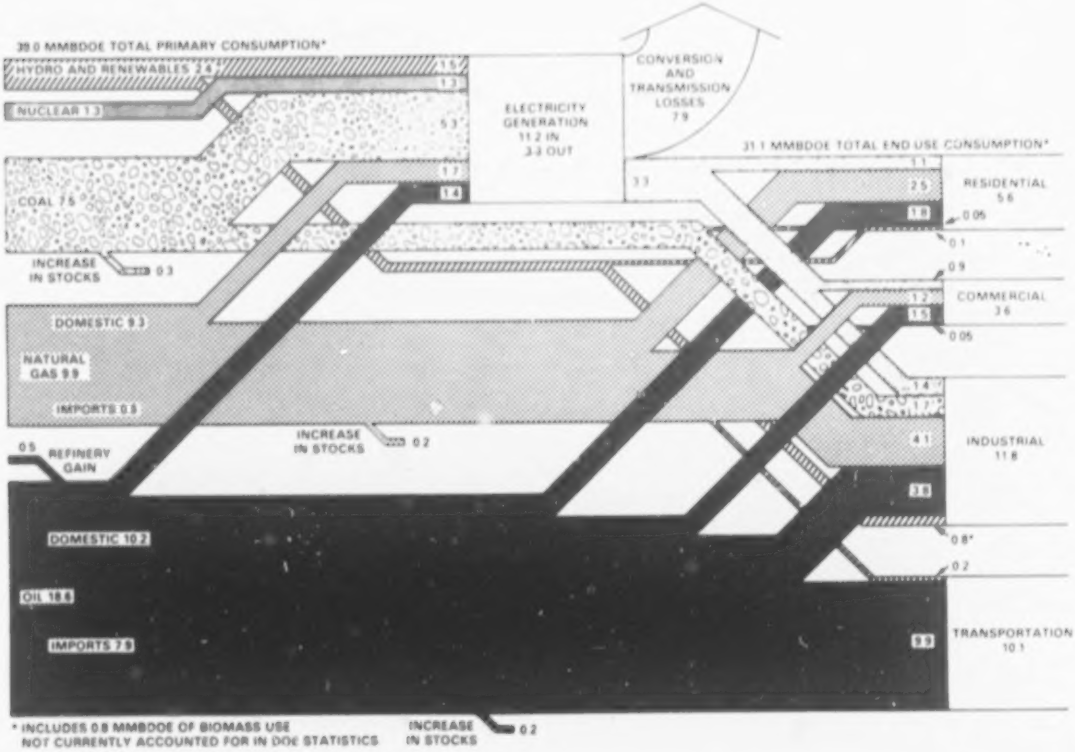
Of the low-temperature collectors used for pool heating, only 18% were metallic. The remaining 82% were nonmetallic. Liquid collectors again dominated the market. Air collectors accounted for only 3.5%. Concentrating collectors accounted for 1.7% and evacuated tube types accounted for 0.6%.

In 1980, the market shares went this way: residential 83%; commercial 12.5%, industrial 2.5%, government 2%, and agricultural 0.5%.

A total of 13 manufacturers of photovoltaic modules reported total production in the first half of 1981 at 3,375 peak kilowatts, of which nearly 40% went to the remote communications market. Exports to 28 countries accounted for 21% of production.

Of the remaining production, 23% went into agricultural applications, 19% into industrial applications, 18% into commercial applications, and less than 1% into residential applications.

Comparable shipments for the first half of 1980 totaled 1,841 peak kilowatts and, in the second half, 2,363 peak kilowatts. Exports accounted for 41% of all activity in the first half of 1980, 43% in the second half.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0.1
0.9
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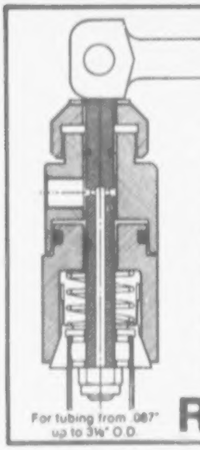
SOURCE: EIA MONTHLY ENERGY REVIEW, SEPTEMBER, 1980

U. S. ENERGY SOURCES and uses in 1979 expressed in millions of barrels per day of oil equivalent.



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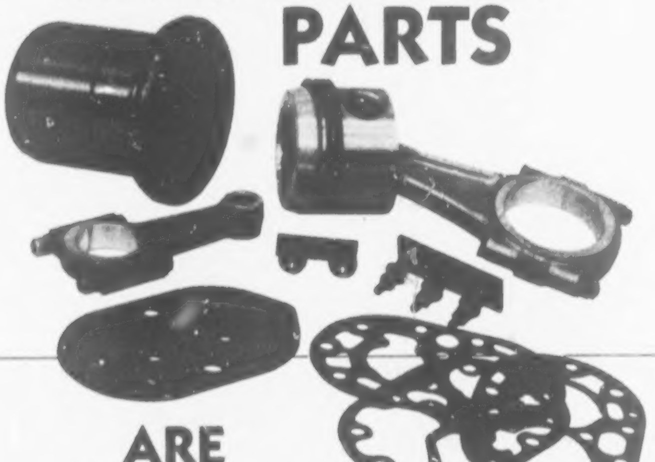

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At
Copeland we're
committed to
giving you
more...

more capital, technology and human resources to meet tomorrow's air conditioning and refrigeration demands

Copeland's commitment to offering superior compressors runs deep. Through **TECHNOLOGY.** Product and manufacturing expertise allows us to respond to energy challenges of the future — today. Through **PRODUCTS.** Copelametic® and Copelaweld® compressors and condensing units are all designed for added energy efficiency. Through **FACILITIES.** New focused manufacturing plants provide new levels of product quality and consistency. Through **SERVICE.** New remanufacturing facilities and expanded wholesaler locations mean extra support capabilities.

That's the Copeland commitment to you.

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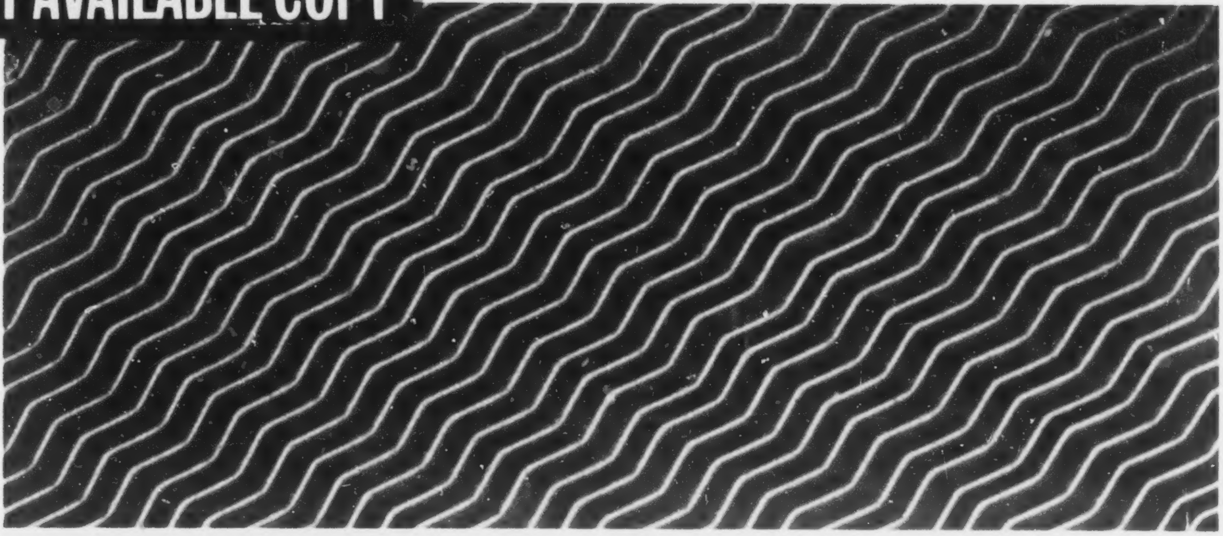
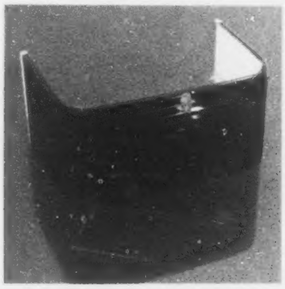
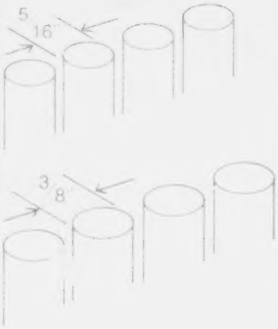


We've given condenser design a new wrinkle... to save materials, energy, and money.

You're interested in cost-efficient designs... but don't want to sacrifice capacity. Sundstrand's application of the "K" pattern lets you have it both ways. This coil design uses considerably less aluminum fin stock. It also saves approximately 15% on the amount of refrigerant required.

Yet, with the same envelope size, we can provide equal or improved capacity and efficiency. If you're concerned about cost... but can't sacrifice capacity, think "K" from Sundstrand Heat Transfer.





"K" pattern is 5/16" tube and 1" x .75" fin pattern, replacing 3/8" tube and 1.25" x 1.08" fin pattern.

CAPACITY	COND. TEMP.	ALUM. WT.
18000	125°F	8.5#
24000	125°F	10.1#
30000	125°F	12.4#
36000	125°F	15.2#

Compare your condenser aluminum weights to those possible by using the "K" pattern. It should save you money.

SUNDSTRAND
East Prairie Ronde Street, Dowagiac, Michigan, USA 49047

HeatTransfer,Inc.